CENSUS OF INDIA

Paper No 2

1954

Life Tables — 1951 Census

Price Re. 1 or 1 sh. 6 d.

PREFACE

The scrutiny of the age returns of the 1951 Census and the preparation of Life Tables for the census was entrusted to Shri S. P. JAIN, who was appointed Census Actuary in addition to his duties as Statistician, Labour Bureau, Ministry of Labour. The Age Tables prepared by Shri JAIN for 1951 as well as 1941 census have been published in Census of India Paper No. 3 of 1954 entitled "Age Tables — 1951 Census" along with a note by him. Shri JAIN has since constructed Life Tables. These Life Tables along with Shri JAIN's Actuarial Report are printed in this Paper and presented for public information.

NEW DELHI ;
15th February, 1954

R. A. GOPALASWAMI,
Registrar General, India.

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Census of India Paper No. 2 of 1954

Actuarial Report—1951

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THIS is a Report on the seventh of a series of investigations into the mortality of the Indian population based on the Census data. The first three were made by Sir George Hardy, the fourth by Mr. T. G. Ackland with reference to 1911 Census, the fifth by Mr. H. G. W. Meikle with reference to 1921 Census and the sixth by Mr. L. S. Vaidyanathan with reference to 1931 Census. No such investigation was carried out in connection with 1941 Census and even the usual age tabulations were not compiled owing to war-time pressure of work. Age tabulations were however made 7 or 8 years later. The present investigation has interests and problems of its own, coming as it does after two decades during which vital changes have taken place in the country. Registration data relating to deaths continue to be as unsatisfactory as ever. In fact, during the War years registration work deteriorated further and it is not certain whether the system has yet returned to its prewar efficiency even. The sound method of comparing deaths in an age sector with the relevant exposed-to-risk population continues to be ruled out, and to investigate into the mortality experience of the population, resort has to be made to the improvised method of comparing the age distribution at two censuses. This time the problem bristles with certain peculiar difficulties. There was a belated effort and age tabulations of 1941 Census data for the Part A States by single year of age were brought out, but age distribution for certain others are still not available. Birth-place statistics also, which supply the data on immigration and emigration for States, were not tabulated ; only for a few units information on immigrants is available. The last decade saw the integration and division of States, which made revolutionary changes in the extent of the various State units, in which the country is usually considered. The unprecedented movement of population following in the wake of Partition so thoroughly changed the composition of the indigenous population in certain States like Punjab and West Bengal that comparisons of age composition at the two Censuses for deriving mortality rates have practically no significance. However, there have been two developments in 1951 Census, which have considerably mitigated the rigours of these difficulties.

(1·1) So far life tables based on the mortality investigation have been prepared mainly for each State unit. In 1931 Report, life tables are given for every British Province including the small States, if any, in direct political relationship with it. This time the Registrar General took an important decision to group the political units into 6 zones and to present the Census data for these zones, which has, of course, to be assembled from the primary units. This approach paved the way for the decision to prepare life tables for Zones only. Most of the internal migration between States is on a regional basis, and, therefore, the effect of migration on the growth of Zonal populations is smaller compared to that in the case of State units. This factor is of considerable significance in view of the absence of proper migration data in respect of 1941 Census. Further, the formation of Zones solved the problem created by the absence of data on age distribution in certain areas. The age data which are available for a greater part of a Zone may be taken to reflect the age distribution of the Zone as a whole. This assumption made it possible to prepare the life tables for five Zones but North-West India Zone presented a peculiar problem. The population of Punjab was badly disturbed by migration on a large scale and hence was not amenable to treatment adopted for the mortality investigation. For the remaining areas data on age distribution in 1941 was available for a population of 14,808 thousands as against the Zonal population of 31,967 (excluding Jammu and Kashmir) in 1941. This coverage is not considered to be sufficiently complete to justify the assumption that the available age distribution reflects the distribution in the Zone as a whole, particularly when the areas for which the age data are available were themselves considerably disturbed by the migratory movement

following Partition. It was, therefore, decided not to prepare life tables for the North-West India Zone. Owing to similar disturbances after Partition in West Bengal, the data relating to this State have not been included in the construction of life tables for East India Zone. These decisions incidentally solved the problem arising out of the inflation of population returns in 1941 Census for the two States of Punjab and Bengal, where this trouble was acute, have been dropped out.

(1.2) The other notable development in 1951 Census is the tabulation of a 10 per cent. sample by single year of age. So far, the actuary was being furnished quinquennial group populations according to an age grouping fixed for him, along with a single year age distribution of a limited number ranging from 25,000 to 100,000 for each sex selected at random from representative tracts in some of the major provinces, and he had to make the most out of it. This time single year age returns based on a large-sized sample make it possible to study the data and to make any groupings considered suitable. This change gave a large latitude for exploring alternative methods of dealing with the subject. One important advantage accruing from this change is that it has been possible to prepare Age Tables by single year of age corrected for misstatement of age on the basis of features shown by the primary data. The Age Tables along with an explanation of the treatment of age data have been published separately in Census of India Paper No. 7 of 1953. The explanations given there form an integral part of the discussions in this Report.

2. The Method

(2.0) The method followed in the present investigation continues to be based, in principle, on tracing cohorts living at one point of time to their survivors at another point of time. However, the details of application of the principle are different. The age returns by single year of age being seriously distorted, calculations are based on population in quinary age groups 3—7, 8—12 etc. The group totals after necessary correction for systematic bias and smoothing as explained in the construction of Age Tables are used to obtain population at mid-ages 5, 10, 15 etc., as at 1941 and 1951 Censuses. From these estimates of population at pivotal ages, the probabilities of surviving for 10 years are obtained by dividing population at pivotal age x+10 in 1951 by the population at the pivotal age x in 1941. The probability, p_x, of surviving one year for individual ages is interpolated from the ten year survivance probabilities by applying to their logarithmic values the fourth and fifth order difference osculatory interpolation formulae developed in connection with Age Tables. In this procedure, stand has been taken on the fact that the primary data can be used to yield population estimates at pivotal ages only. From the pivotal values ten-year survivance probabilities are deduced and so these are firmly related to the primary data. The values of the primary function q_x shown in the life tables so prepared are the results of mathematical calculations from the observed ten year-survivance factors.

(2.1) The main method described in (2.0) gives firm estimates of p_x for the ages 5 to 60. Other methods have to be adopted to extend the rates to the extremities of span of life. Owing to the well-known unreliability of age returns at very old ages, say, above 75, the values of p_x obtained for ages beyond age 60 by the main method have not been adopted. As was done in the case of English Life Tables in a similar situation, a Gompertz curve is used to extend the table to the end of life.

(2·2) There are no data on which to base the rates below age 5. The life tables are extended below age 5 by fitting the curve

$$l_x = A + Hx + Bc^x + \frac{m}{nx+1}$$

to values of l_x, the life table value of the number living at age x, already obtained for ages 5 and above. This curve has been used for the purpose in constructing the Indian Life Tables in the past but this time the values of the constants are determined with reference to the current data relevant to the Zone concerned. In the above equation, actual calculations show B to be a positive large number and c a positive fraction. Thus, the term Bc^x decreases in geometric progression with increase in age, which indicates that the role of c is to regulate the decrease in the extra child mortality as age increases. The value of c is, therefore, determined by calculations made on the average rates of mortality at ages 1, 2 and 3 shown by old foreign well-

constructed life tables, which show a mortality level as heavy as is known to prevail in India. By a happy coincidence, c works out to be 0·45 for males, which is the value assumed by Vaidyanathan in 1931 investigations, but for females it comes out to be 0·474.

(2.21) The values of the constants A, H and B in the expression for l_x have been determined by fitting the equation without the last term $\frac{m}{nx+1}$ to l_5, l_6 and l_7 taken from the relevant Zonal life table. The term $\frac{m}{nx+1}$ is meant to provide for a heavy infant mortality, which is characteristic of the Indian experience. The term should become insignificant when x reaches the age 5 and this objective is served, if n be taken as 20. The constant m is so determined that the ratio of l_1 to l_0 gives the average infant mortality rate for the Zone during the intercensal period. Owing to the unreliability of registration records, the registered infant mortality rates do not serve the purpose. From general considerations, a lower and an upper value of infant mortality have been fixed, which are considered to be safe limits within which the true value would lie. The resulting values of rates of mortality for ages 0-4 along with the corresponding values of expectation of life are given in Tables B. While it is considered that this would meet the ends of scientific accuracy, for practical purposes definite values of rate of mortality for ages 0-4 are still needed. Accordingly, a definite value of infant mortality rate, based on an intelligent guess, has been assumed and the life table has been extended below age 5 on this basis. Thus, rates below age 5 are not based on solid facts but to an extent on a subjective estimate. This explains why the portion of the life tables below age 5 is shown in italics. The position has been frankly stated to be scientifically correct, but this should not lead to any lack of confidence in the figures given out on estimated bases. It is maintained that even this portion of the present life tables conforms more to facts than it did in the past. Application of mortality rates in this age sector from the present Zonal life tables to the calculation of birth rates in the individual States by the 'reverse survival' method yielded estimates, which were, in almost every case, consistent with those derived by an independent method not involving the use of life tables. Details may be seen in the Annexure in Appendix II to 1951 Census Report. Here it would suffice to cite this as an evidence of the soundness of the life tables. It will be seen by taking the figures shown in the life table with the relevant figures in Table B that expectation of life at birth as given in the life table may be out by 1 or 2 years either way, if at all. According to 1941-50 experience, expectation of life at birth was 32·45 for males and 31·65 for females. It is unlikely to have been higher than 33·67 for males and 32·85 for females or lower than 29·87 for males and 29·62 for females. According to 1931 investigation the corresponding figures were 26·91 for males and 26·56 for females. Kingsley Davis has given in his book 'Population of India and Pakistan' an abridged life table for 1931—40 based on the then available age returns for 1941, which covered 46·5 per cent of the total population of India. According to him, the expectation of life at birth was 32·09 for males and 31·37 for females.

(2.3) The Life Tables for the five Zones separately for the two sexes based on the rates obtained as explained above are shown in Tables A. The various functions shown therein have been calculated in the usual way. The values of L_x, the number living between ages x and x+1, for ages below 5 have been obtained by integrating the expression for l_x, while for ages 5 and over, as usual, mean of the values of l_x and l_{x+1} has been taken. The Life Tables for All-India have been constructed in the same way as the Zonal Life Tables from the pivotal populations by combining the estimated pivotal populations of the Zones.

Recommendations have been made by the actuaries in the past to make arrangements for the collection of reliable data on deaths by ages near about the Census time at least in selected areas. Only by collecting direct data on mortality can reliable information on the Indian mortality experience be obtained. The importance of a sound mortality table covering the experience of the general population in demographic studies cannot be over-emphasised. Such a table is an invaluable guide for purposes of planning and policy-making in a Welfare State. It may not be too much to expect that now at least steps will be taken to collect such data and that the

next life tables of India will be prepared from well-recorded deaths by age in some selected areas at least. In particular, there are no data for determining mortality in the childhood ages. The recommendation to collect reliable data on deaths below age 15 at least in representative small areas in each State repeated in para 61 Section IV of 1931 Actuarial Report by Vaidyanathan deserves to be specially emphasised. The type of investigation that is carried out at present in the absence of anything better cannot be held to be completely satisfactory. However, when a plea is put forward for collecting a reliable record of deaths by ages, a warning may be sounded about planning it cautiously. It may be prudent to institute a pilot enquiry in certain areas. In a similar enquiry in Mysore in 1940 details of which are given in 1941 Part I—Census Report for Mysore the number of deaths by age obtained in the enquiry had to be raised arbitrarily in the ages below 20 and above 70 by varying percentages in order that they may appear sensible.

A detailed discussion of the methods mentioned in the preceding paragraphs is given below. This is followed in paras 10 and 11 by a discussion of the results obtained.

3. Age Data

The primary material required for the mortality investigation of a zone based on the data of two Censuses is the age distribution of the population of the Zone. We may either work on the actual figures of population by age as at the two censuses or reduce them proportionately for convenience of working with smaller figures. The latter approach becomes necessary when the area covered by the Zone has undergone a change during the intercensal period and it is not possible to reconstruct the age distribution for the same coverage of area at the two Censuses. In such a case it is assumed that the available age distribution reflects the distribution for the whole area. A convenient figure P may be taken for the first Census and the corresponding population P′ at the second census may be calculated by multiplying P by the ratio of the total population of the Zone at the second census to its total population for the same coverage at the first census. The age composition of populations P and P′ may be worked out by applying the age distributions at the respective censuses This procedure was actually adopted for obtaining populations P and P′ and their age distributions, such that P observed at 1941 changed over to P′ by 1951 as a result of the changes that occurred in the actual population during the intercensal period. There is a yet more important reason for adopting this procedure, which will be clear from the figures shown in Table 1 given below :—

Table 1

Zonal Table	States included	Population in 000's 1951 (excl. D. P.)	1941	1941 pop. for which age data are available
(1)	(2)	(3)	(4)	(5)
1. North India	Uttar Pradesh*	62,735	56,532	55,895
2. East India	Bihar*, Orissa*, Assam*, Manipur*	64,124	58,401	56,202
3. South India	Madras*, Mysore*, Travancore-Cochin*, Coorg.	75,584	64,837	64,647
4. West India	Bombay*, Saurashtra, Kutch	40,251	33,250	24,904
5. Central India	Madhya Pradesh*, Madhya Bharat, Hyderabad*, Bhopal, Vindhya Pradesh.	52,055	47,274	38,213
6. All India	All the above States.	294,749	260,294	239,861

In Table 1, States which have been excluded from this investigation are not shown. The populations of persons in 1951 and 1941 covered by the Zonal tables according to 1951 lay out are shown in columns (3) and (4). It will be observed that 1951 population is shown exclusive of displaced persons. It was a happy decision to prepare sample age returns for the general population separately from those for the displaced persons. This suits the purposes of life tables admirably, as it cuts out the disturbance in age distribution due to this abnormal immigration. In column (5) is given the population of persons for which age tabulations for 1941 are available, the relevant States being marked by asterisks in column (2).

In addition, in West India, age tabulation relating to Bhavanagar State, having a population of 618 thousands, is also available, and this population is included in the figures shown in column (5). In Central India, similar data for Rewa and Gwalior having a population of 5827 thousands are available and are included. The age data in respect of Mysore, Travancore-Cochin, Bhavanagar, Rewa, Gwalior and Hyderabad are available by single year of age upto age 4 and in quinquennial groups 5—9, 10—14, etc., for the later ages, the last group being 70 and over. These group totals had already been smoothened before publication. For the rest of the States, population by individual ages is available. As is explained later, the individual age data are combined into quinary groups 3—7, 8—12 etc. and corrections for systematic bias are made. In the case of the above six States, the corresponding group populations according to 3—7 grouping have been obtained by breaking 5—9 grouping on *pro rata* basis. For instance, group total for 8—12 was obtained from $\frac{2}{5}\times$ (5—9)+ $\frac{3}{5}\times$(10—14). The age-distribution of Mysore and Travancore-Cochin in 1941 is similar to that of Madras. The age distribution of Bhavanagar agrees with that of Bombay but those of Rewa, Gwalior and Hyderabad are perceptibly different from that of Madhya Pradesh.

Table 1 shows that 1941 age distribution is available for a major portion of the Zones. In West India and Central India the coverage is less complete than that in the case of other Zones. The available age distribution is taken to indicate the distribtution in the Zone as a whole. The age distribution in 1951 for a Zone is obtained by weighting the age-distribution of each State in the ratio of their respective populations, so that finally the totals of 1941 and 1951 age distributions are in the ratio of the total population of the Zone in 1941 and 1951. Thus, 1951 age distribution above age 10 so obtained, subject to correction for changes due to migration, represented the survivors of 1941 age distribution. In further discussion, unless stated otherwise, 1951 population is taken as having already been corrected for migration. A comparison of the 1951 population aged x+10 with 1941 population aged x gives the probability of the latter population surviving for 10 years. This comparison of cohorts in two age distributions is the basis of the method adopted in deriving mortality rates from the data for two Censuses. Before proceeding further, it may be desirable to discuss the real significance of mortality rates obtained on this basis.

4. Rationale of the Method

(4.0) In deriving mortality rates from the ratio of population P'_{x+10} aged x+10 at 1951 Census to the population P_x aged x at 1941 Census, it is assumed that there is a common mortality scale, which is applicable to all generations crossing the intercensal period. Persons, who may be living at age x at any time in the intercensal period, are subject to q_x, the rate of mortality at age x according to this common mortality scale. In this way, 1941 population moves on to 1951 population under the operation of this common scale. This scale fixes rates of mortality at different ages to which the community is subject. These rates of mortality determine the various functions of the relevant life table, such as L_x which represents the number living between ages x and x+1 at any time in the community subject to those rates of mortality. P_x and P'_{x+10} should be taken as the observed values of L_x and L_{x+10} at times of the censuses.

Thus,

$$P'_{x+10} / P_x = L_{x+10} / L_x$$

Adopting the well-known approximation $L_x = l_{x+\frac{1}{2}}$, where l_x represents the usual life table number surviving to age x, we have

$$\frac{P'_{x+10}}{P_x} = \frac{l_{x+10+\frac{1}{2}}}{l_{x+\frac{1}{2}}} = {}_{10}p_{x+\frac{1}{2}}$$

which gives the probability that a person exactly aged $x+\frac{1}{2}$ will survive for the next 10 years. In the next para, we shall see what the 'common mortality scale' connotes with reference to the actual conditions.

(4.1) In essentials, the common mortality scale determines mortality rates which operating on 1941 population will reproduce individual age population above age 10 as enumerated at 1951 Census. Let ${}^{43}P_{22}$ denote population aged 22, which would be enumerated, if a Census were taken at the corresponding time in 1943; similarly let ${}^{43}q_{22}$ denote the rate

of mortality actually experienced by persons aged 22 in the year 1943. Tracing a group through the intercensal period, it is seen that $^{41}P_{20}$ successively changed to the numbers $^{42}P_{21}$, $^{43}P_{22}$ ..... $^{50}P_{29}$, $^{51}P_{30}$ year by year by the operation of mortality rates $^{41}q_{20}$, $^{42}q_{21}$, ... $^{50}q_{29}$. In the same way, $^{41}P_{29}$ changed to $^{51}P_{39}$ by the operation of $^{41}q_{29}$, $^{42}q_{30}$, ... $^{50}q_{38}$ and similar remarks apply to $^{41}P_{21}$, $^{41}P_{22}$ ..... $^{41}P_{28}$. Thus, the population aged 20—29 in 1941 moved on to the population aged 30—39 in 1951 by the operation of the rates of mortality relating to ages 20 to 38 as actually prevailing in the various years of the decade 1941-50. In this movement the actual mortality rate at age 29 as experienced in each of the ten years of 1941-50 was effective. However, for any other age the position is different ; in these cases the actual mortality rate as experienced in only some of the years of 1941-50 was operative. For instance, the actual rate of mortality at age 25 as prevalent in 1941, 1942, ... 1946 counted in this movement. The rate q_{25} as it prevailed in 1947-50 was operative in the movement of the age group 16—19 in 1941 population to the group 26—29 in 1951 population, and thus, the cycle for q_{25} was completed. The same is true of the rates of mortality at any other age above 9 ; the case of rates at ages below 10 will be taken later. Thus, as 1941 population moved by survivance to 1951 population aged 10 and above, the rates of mortality for each of the ages 10 and above as prevalent in each of the years of the period 1941-50 had their effect. It follows that rates of mortality at age 10 and above, which operating on 1941 population reproduce 1951 individual age population, are really the actual rates of mortality prevalent in each of the year in 1941-50. In the explanations given above, the unit of reference has been taken to be a year for convenience only. It could have been as small a unit of time as desired. Now, it is easy to see the practical significance of the rates of mortality on the common mortality scale, which also do the same function of reproducing 1951 population from 1941 population. Thus, rates of mortality at ages 10 and above deduced on the assumption of a common mortality scale as explained in (4.0) are some sort of overall rates based on the actual rates experienced during the entire period 1941-50. Overall rates need not necessarily be average rates. They are characteristic of the mortality of the whole intercensal period, and do not relate to any particular point of time.

The above interpretation does not apply to the rates of mortality derived for ages below 10, for consider the value of q_5 so derived. In the process of the movement of 1941 population by survivance only $^{46}q_5$, $^{45}q_5$, ... $^{41}q_5$ were operative but not $^{47}q_5$, $^{48}q_5$, $^{49}q_5$, $^{50}q_5$. In the extreme case of age 0 only $^{41}q_0$ was operative but not $^{42}q_0$ ..... $^{50}q_0$. Thus the rates of mortality for ages 0 to 9 derived by the method do not represent overall rates of mortality prevalent during the entire period 1941—50, but are based on the actual individual mortality rates as prevalent only in certain years of the decade 1941-50. To this extent, the rates of mortality for ages below 10 calculated by the method, explained in (4·0) do not refer to the experience of the entire period 1941—50.

(4·2) The significance of the rates referred to above may be contrasted with that applicable to the rates of mortality derived by dividing the actual deaths at age x during a number of years, usually 2 or 3 years, by the relevant exposed-to-risk population aged x. Here deaths and the population are tied up and, therefore, the derived rates represent the actual 'average' rates prevalent during the period of observation. In practice, the relevant exposed-to-risk population is estimated on a reasonable basis, as it is not practicable to ascertain correctly the population in each of the years, for which deaths are recorded. This approximation does not alter the real significance of the rates as explained here.

5. Group Population

(5.0) Indian age returns by single years of age are notoriously distorted due to marked lumps at ages having 0 or 5 in unit's place and deficiencies at other ages. In the past, the actuary was furnished enumerated populations in the quinary groups 0—4. 5—9 etc. along with a small sample age distribution by single year of age to correct for the distortion in the age returns as best as he could. Even after the correction, the group populations did not come out to be satisfactory for the application of the method of comparison of cohorts for deriving mortality rates. The main headache of

the actuaries in constructing Indian life tables has been to suitably reconstruct the populations by age groups. The availability of population by single year of age in 1951, though permits formation of any age grouping, does not alter the fact that the starting point has still to be group populations. The figures of single year age population are so seriously distorted due to preferences for certain digits that they have a meaning only when taken in groups. There seems to be no way of correcting the distortion by directly working on individual year populations, group populations have to be formed first. The group totals themselves are not satisfactory and need adjustment. At this stage various possibilities, detailed below, suggest themselves.

(5·100) One possibility, which has been followed in the past for preparing Indian life tables, is to reconstitute the population by ages on the basis of the observed growth rate. From the data relating to the two Censuses, the group populations at a convenient point of time were fixed, and these were projected on either side of the point by applying observed growth rate, so as to obtain age distributions of the population at two points of time. The mortality rates were then determined by the usual method of following cohorts in the two reconstructed distributions. Further details of the methods adopted also are interesting. In 1911—20 investigation the 'convenient point of time', for which standard group populations were fixed, was the Census date in 1921 itself; in the preceding and the succeeding investigations it was the mid-censal date. The precise method adopted for fixing the standard group populations from the two censuses seems to be to take an arithmetic average of the censal group populations, and to graduate the mean group populations. In 1901—10 investigation, the standard group populations were projected backward and forward by 5 years and thus reconstructed age structures of the population as in 1901 and 1911 were obtained. However, for some provinces, the projection was made by only ½ year on either side of the mid-censal date. In 1911—20 investigation, the period of projection was ± 2½ years, while in 1921—30, it was ±½ year. Considerable ingenuity was exercised in determining the value of r_x, the growth rate of population aged x, for projecting population on the assumption of a geometrical rate of increase. In 1901—10, r_x was graduated by various exponential curves. In 1911—20, r_x was sometime taken constant for all ages and some time variable and some time mean of constant and variable values. In 1921—30, r_x was graduated by fitting a cubical parabola to log r_x by the method of least squares. Varied methods of graduating group populations were adopted. In 1901—10, the main graduation formula was $Y_x = ax^b (\omega - x)^c$, where Y_x is population at age x; a, b and c are constants and ω is the extreme age in the span of life. Other curves were adopted where this did not work. In 1911—20, log T/T′ was graduated by $1+ax+bx^2+cx^3$, where T and T′ represent populations aged x and above, T referring to the graduated population and T′ to a standard well graduated table. In 1921—30, the ratio T/T′ was taken in place of its logarithm.

(5.101) The above details have been recounted to show that fairly complicated calculations were made merely to reconstitute the age structure of the population at two points of time, but that the basic method of determining mortality rates was still the comparison of cohorts in the two age distributions. The projection of the standard group population by ±2½, ±5 years or ± ½ year does not alter this position. It appears that the period of projection should depend on the sensitiveness of the method by which r is determined. Projection by ½ year would be justified if the method of calculating r_x yields values of r_x which can produce reliable estimates of population at individual ages at an interval of half year from the point of projection. In the previous investigations in the main, growth rate, r_x, was used to project group populations only by a substantial period. The fact that by projecting by ±½ year, subsequent calculations are reduced and values of probability of surviving one year are directly obtained can be no consideration unless that kind of projection can be justified on its own. The relevant point is the possibility of getting reliable age distribution of the population in accordance with the actual. This is considered in paragraph (5.21) after the other possibilities have been described.

(5.11) Another possibility is that the deficiencies in the group populations may be corrected on some reasonable basis, and mathematical curves may be fitted to the resulting group populations at the two censuses. The curves may be

used to obtain corrected population distribution by individual ages for the purpose of comparing cohorts at two censal points. In this connection Pearson's Frequency Curves have been found to be very useful. Egyptian Life Table for 1917-27 was prepared on this basis. For preparing abridged life tables for ages in ten yearly groups for 1911—20 and 1931—40, Kingsley Davis adopted this procedure. He corrected the group populations for under-enumeration of children in age group 0-4 and the existence of a pronounced trough at ages 15-24 and fitted to the corrected group population by the method of moments the curve $Y=Y_0\,(a-x)^c$ which is a modification of Pearson curve type IX. The equation gave population by single year of age for the purposes of following the cohorts at two points of time. An attempt was made to fit a Pearsonian curve to the data relating to Madras males 1941. From the criterion given in Pearson's 'Tables for Statisticians and Biometricians' it appeared that a curve of Type I would suit the data. The equation of the curve came to be of the type

$$Y=Y_0\left(1+\frac{x}{a_1}\right)^{m_1}\left(1-\frac{x}{a_2}\right)^{m_2}$$

This type seems to be applicable to the Indian data in many cases, since population curves in such cases, as in Madras males 1941 data, have the appearance of a twisted J—shaped curve, which is a particular case of this type. It will be recalled that Ackland graduated his data by means of the curve $Y=ax^b(w-x)^c$. Pearsonian curves have found a good application in actuarial investigations.

(5.12) There is a third approach. The group totals may be corrected for the deficiencies in so far as possible in accordance with the features shown by the primary data and used to give population at pivotal ages only. By comparing cohorts probabilities of survival at pivotal ages may be got, and single year probabilities of survival for individual ages may be obtained by means of osculatory interpolation. This method of pivotal values and osculatory interpolation has been used in the construction of the last four English Life Tables.

(5·20) The approaches in paras (5.11) and (5.12) differ from that in (5.100) mainly in the treatment of the subject of deficiencies of the group populations as given by the censuses. In the former methods the emphasis is on the corrections for the deficiencies being based on the requirements as revealed by a study of the peculiarities of the primary data. The group populations, from which the final mortality rates are derived, still relate to the censal dates. The method in (5.100) is comparable to a steam-roller type. Since group populations given by the census are unsatisfactory, the whole set of data are recast on a certain model. Based on that model, age structure at any two convenient points of time are determined for the purpose of comparing cohorts and derivation of mortality rates therefrom. The investigation in 1921—30 went further on this basis and derived two age structures by individual years at an interval of 1 year, claiming thereby that 'we obtain the respective number of people that would have been returned at each age had two Censuses been taken, one on a date six months anterior and the other six months posterior to the middle day of the decennial period'. As already mentioned, in 1901-10 investigation also this procedure was adopted in the case of some provinces. In 1911-20 and 1901-10 investigations, generally the function of recasting was more limited in that only quinary group populations at considerable distances ($2\frac{1}{2}$ or 5 years) from the 'point of projection' were obtained. The quinary group populations really gave probabilities of survival or death within the next 5 or 10 years for central ages only, from which single year probabilities for individual ages were interpolated. This shows that in so far as the use of the corrected group populations is concerned, it is the same as in the method described in (5.12). The point to be considered is how far the model can be held to have conformed to the actual conditions and given an age structure representing the actual. This may be considered only for the simpler case when the function of recasting on this model is taken only in the limited sense described above. The procedure adopted in 1921-30 investigation goes much further.

(5.21) The basis of the procedure that has been adopted in reconstituting the age distribution is (*a*) to take the values of r_x from the age distribution shown by the two censuses, and smoothen them by a mathematical curve and (*b*) to assume that number of persons aged x observed at the first census have changed to the number

aged x observed at the second census according to geometric progression. In some cases, r_x does not relate to the intercensal period considered. This procedure has been applied in scientific work to calculate age-distribution of a population at any point of time other than that for which the age distribution is known, when the object is to obtain group populations to be used in the denominator as representing the exposed-to-risk in the calculation of a rate. In such cases, any approximate figure can serve the purpose. It seems doubtful whether the method can be considered to be equally satisfactory when the estimated group populations are to be used for following cohorts to assess the changes brought out in number by the operation of mortality. There seems to be no *prima facie* reason why r_x should progress smoothly as age-group x changes, nor is geometric rate of growth of population in an age sector over time a universal law. There seems to be nothing common between two adjoining groups and neither there seems to be any controlling factor which may regulate the growth in one group to accord with that in another in a manner that r_x may vary smoothly with x. In fact, instances promptly come to mind when a particular calamity, which is quite characteristic of the Indian experience, affected an age group more than an adjoining one with the result that the adjoining groups show movements in opposite directions. Ackland in para 14 of his Actuarial Report has stated that the rates were found to be widely different in different age groups. The following table shows the observed values of r_x with reference to the actual data relating to U. P., (whose area remained practically unchanged from 1911 to 1951) and England and Wales. The table illustrates the point that r_x need not progress smoothly as x changes, nor need it remain contant in time, which a geometric increase of r_x for a given age x would require.

Table 2

Age Group	Value of r_x — UTTAR PRADESH 1921/1911	UTTAR PRADESH 1931/1921	UTTAR PRADESH 1941/1931	UTTAR PRADESH 1951/1941	England and Wales 1921/1911	England and Wales 1931/1921
0–4	·9646	1·3308	1·0450	1·1051	·9060	·9228
5–9	1·0165	·9457	1·2367	1·0832		
10–14	·9546	1·0720	1·0824	1·2048	1·0478	·9272
15–19	·9545	1·1836	1·1872	1·2192		
20–24	·9106	1·1595	1·0863	1·1418	·9771	1·1210
25–29	·9214	1·0845	1·1009	1·0624		
30–34	·9396	1·0004	1·1150	1·0504	1·0102	1·0563
35–39	·9746	1·1483	1·1753	1·0795		
40–44	·9282	·8723	1·1764	1·0944	1·2042	1·0420
45–49	1·0261	1·1755	1·2441	1·1182		
50–54	·9592	·7553	1·2495	1·1486	1·2652	1·2209
55–59	1·0630	1·3870	1·3779	1·1662		
60–64	·9443	·6885	1·2520	1·1482	1·2414	1·2908
65–69	1·1334	1·2094	1·7143	1·1837		
70 and over	1·0196	·7502	1·4875	1·6733	1·2185	1·2968
All Ages	·9829	1·0438	1·1546	1·1310	1·0504	1·0545

There is a yet more fundamental point to be considered. Let us take two ages x and x+1, having populations P_x and P_{x+1} in 1941 and P'_x and P'_{x+1} in 1951, and let r_x and r_{x+1} be the growth rates obtained for these ages. According to the method adopted, the probability of survival at age $x+\frac{1}{2}$, i. e.,

$$p_{x+\frac{1}{2}} = \frac{P''_{x+1}\, r_{x+1}^{+1/20}}{P''_x\, r_x^{-1/20}}$$

where P''_x and P''_{x+1} are the populations at the midcensal date, which are derived from populations at x and x+1 in 1941

and 1951. In the above expression, the probability at age $x+\frac{1}{2}$ is determined entirely by the relation of P_x to P'_x and that of P_{x+1} to P'_{x+1}. Obviously, P_x and P_{x+1} are not affected by the mortality during the intercensal period. For the sake of concreteness, let us take x=20. Now, P'_{20} are the survivors of P_{10} in 1941 and were not affected by the mortality at age $20\frac{1}{2}$ during the intercensal period. Similarly, P'_{21} are the survivors of P_{11} in 1941 and are affected by the mortality at age $20\frac{1}{2}$ only during the last six months of the intercensal period. Thus $p_{x+\frac{1}{2}}$ is determined very largely independently of the mortality at the age during the intercensal period. For simplicity, the point has been discussed for single years of age when the mid-population is projected by $\pm\frac{1}{2}$ year. The argument can be easily extended to the case when an age group is considered and the midcensal population is projected by $\pm t$ years. The discussion here shows that the rates of mortality, as calculated by the method, are practically uninfluenced by the actual mortality experienced at that age in the intercensal period. It does not seem possible to give the rates of mortality calculated by the method the significance developed in para (4·1). It appears difficult to say as to which period the derived rates actually refer. If it is possible to hold that the projected populations reflect the actual populations at the time, the rates of mortality relate to the period between the projection points. In any case, the real character of the rates of mortality so obtained is that they are derived by the reconstitution of observed population on a certain model and that their significance depends upon the extent to which the model conforms to the actual conditions obtaining in the intercensal or any other period envisaged. It may be mentioned that in 1911-1920, the value of r_x was obtained from the reconstituted age distribution of 1901 group and 1921 group. The 1901 group was derived from 1881, 1891 and 1901 combined by weighting in the ratio of 1 : 2 : 1 and similarly 1921 group was composed of 1901, 1911 and 1921 combined in the same manner. This was done as it was considered that the mortality of 1911-21 was abnormal due to influenza pandemic of 1918, and the quest was for some normal Indian mortality experience. Similar weightings had been resorted to by Hardy in his investigations relating to 1881 and 1901 Censuses.

(5·3). The methods referred to in (5·11) and (5·12) do not suffer from the above limitations, as they are firmly tied to the actual data as at the two census times, but their success depends on the extent to which the deficiencies of the group totals can be removed.

If the intercensal period experienced any unusual calamity, it may be desirable to remove its effect on the age structure observed at the later census, so that the life table deduced therefrom may reflect only the normal mortality experience of the intercensal period. This is done in view of the consideration that the life table is likely to be used for projecting population into future. Purely as an investigation into the mortality experience of the intercensal period considered, the effect of the unusual calamity should not be excluded. It is frequently difficult to make the necessary adjustments to remove this effect. In such cases, it may be more scientific to construct the life table without any adjustment and leave it to the users to make a suitable allowance for the abnormality, when projecting population on the basis of the rates given in the life table. As regards other deficiencies in the data, even though it may have to be done on some reasonable basis due to the absence of the requisite data, it appears more satisfactory to remove them in accordance with their nature rather than effect a wholesale reconstruction of the data. A point, which has been advanced against methods involving separate graduation of the populations at the two censuses and comparison of cohorts in these two age distributions, is that small residual errors in the graduated populations, if in opposite directions in the two populations, would be magnified in the derived rates. Distortion of the rates on this account may actually arise, since it is difficult to remove the major deliberate errors completely from the graduated populations. This apprehension applies to the method described in (5·100) in a similar sense, as the mean population is graduated , and residual errors in the adjoining groups can lie in opposite directions. In such a case, the residual errors will be carried on to the projected populations on either side of the mean. This may result in the group populations compared for deriving rates having residual errors in opposite directions.

The main consideration against the method of fitting a mathematical curve is the difficulty of

finding a suitable curve, which will retain the distinctive features of the census data, even if the tedious calculations, when a dozen life tables are to be prepared, may not be any deterrent. A powerful method like that of fitting a mathematical curve would also remove irregularities that may be inherent in the data. National life tables are not likely to be used for the calculation of financial reserve values and the objective is to present as accurate a picture of the present position as possible. Thus, when retention of the special features of the data rather than high smoothness is the deciding consideration, this method is not suitable. Another consideration when dealing with group population, as in the present case, is whether it is preferable to estimate population for individual ages at each of the two censuses or to derive rates at the pivotal ages from the group populations and to defer estimation for individual ages to that stage. The balance of advantage appears to lie with the latter method. Thus, the method described in (5·12) was adopted in the construction of the life tables this time. The method of pivotal values and osculatory interpolation was devised by George King for constructing English Life Tables in view of the circumstances, which aptly apply to our present case. The consideration then was, as it was in our case, to produce not only rates of mortality for the construction of a life table but also a table of the population age by age with inaccuracies removed as far as possible. The chief problem was to eliminate 'local' misstatements of age due to preference for certain digits. Further, in the Indian data, the preferences are so dominating that the population data have significance only when considered in group totals. These totals have to be the starting point for any calculations leading to results in respect of individual ages. The graduation of the data is produced by grouping the data quinquennially and deducing pivotal values by means of osculatory interpolation formulae, which assume difference of the fifth order and higher to be negligible. Thus, this method seems to suit our problem better.

6. Pivotal Values

(6·0). The features of the Indian age returns, the various problems of analysis concerned therewith and the manner in which group populations corrected for systematic bias may be obtained are fully discussed in Census of India Paper No. 3 of 1954 entitled "Age Table—1951 Census" to which attention is invited. The discussion in this Paper form an integral part of the present explanations. Without reproducing the details it would suffice here to give briefly the manner in which the group populations are obtained for calculating the pivotal values. Populations by individual year of age for a State separately for each sex are combined to give population in quinary age groups 3-7, 8-12, 13-17 etc. Necessary transfers are made to remove systematic bias in the group populations in accordance with the scheme described in paras (5·10) to (5·12) of the Paper—"Age Tables—1951 Census". The adjusted group populations of the States are combined to obtain the group populations of the Zone in the manner explained in para 3 of this Report. The group populations of the Zone in 1951 are corrected for the effects of migration as explained in para (6·11). The corrected group populations of the Zone as at 1941 and 1951 Census time are smoothed by the method explained in paras (9·0) to (9·2) of the Paper—"Age Tables—1951 Census". In this method, a group population is replaced by the average of the group, the preceding and the succeeding groups weighted in the ratio of 2 : 1 : 1. From the group populations thus obtained, the population at mid-age is calculated with the help of Dr. Kozakeiwicz's Osculatory Interpolation Formulae given in the Appendix. Their derivation is explained in the Appendix to the Census of India Paper No. 3 "Age Table—1951 Census". The formulae (k) to (o) assume differences of fifth and higher order of group populations to be negligible and distribute the group population into population at individual ages in such a manner that the population changes smoothly from age to age. The formulae involve five group totals, two on either side of the group concerned. The formula which gives the population of the mid age is

$$10{,}000\ u_{15} = 66w_5 - 344w_{10} + 2556w_{15} - 344w_{20} + 66w_{25}$$

where w_5, as used here, is different and represents the population of the group 3-7. The formulae cannot obviously give the populations at ages 5 and 10. For this purpose formulae (*a*) to (*j*) have been developed on the basis of differences of the fourth and higher order being negligible. Thus, population at age 5 is obtained from

$$10{,}000\ u_5 = 1840w_5 + 400w_{10} - 320w_{15} + 80w_{20}$$

and population at age 10 from

$$10{,}000u_{10} = -80w_5 + 2160w_{10} - 80w_{15}.$$

The value of u_5 obtained as above is checked with the value of 1/8 of the population enumerated as aged 1-9, and the latter is adopted in case the former is too high. As explained in para (9·2) of the Census of India paper referred to above, the population of the end group 3-7 adopted in the above formulae is obtained in a rough and ready way by subtracting the population of the group 8-12 after smoothing from the unsmooth population of the group 3-12. If it is not very suitable, u_5 would be the most affected, as the three equations given above show. The alternative estimate of u_5 is based on the consideration that all misstatement of age will generally balance within the group, the slight excess at age 8 being offset by the deficit at age 1. Correctly, this estimate relates to age $4\frac{1}{2}$ but it may be nearer the correct population at age 5 in case of a sharp difference with the other estimate. The reason why population at age 9 is not included is that it is greatly depleted by contributing to numbers to age 10, and not to ages below 8.

In this way, populations at quinquennial ages are obtained as at 1941 and 1951 Censuses. The ratio P'_{x+10}/P_x gives ${}_{10}P_{x+\frac{1}{2}}$, where P refers to the population as at 1941 Census and P' to the population as at 1951 Census. Before proceeding further, certain details may first be considered.

(6.10). The age distribution of population is to be corrected for the disturbance due to migration. In the previous Actuarial Reports enough has been said to show that this disturbance relative to the size of the population is quite unimportant in most of the States. The effect of grouping the States into Zones has been to neutralise the substantial movement of population between contiguous areas which fall within a Zone. Migratory movement between Zones has, thus, relative to the Zonal population a much reduced importance. There was a large scale migration following Partition and this would have created a problem in adjusting for migration. Luckily, in 1951 Census displaced persons coming in were tabulated separately, which makes it simple to work on enumerated population excluding displaced persons. The importance of the problem of Muslim emigration has been greatly reduced by the decision to exclude West Bengal and North-West Zone including Punjab from the areas covered by the life tables. These regions account for the main Muslim exodus. In other States, where Muslim migration was worth considering are U. P., Bihar, and Assam, but even there it was of a much smaller magnitude and can be taken with normal migration. Certain States like Madras, Travancore-Cochin, Mysore and Vindhya Pradesh were practically unaffected by this movement. While the factors mentioned above have been helpful in reducing the difficulties of handling the ticklish problem of allowing for migration disturbance, special problems have been raised this time by the absence of the tabulations of birth place statistics in 1941 Census. The whole question of migration during 1941-50 has been considered in detail in another note on 'Computed Birth and Death Rates during 1941-50'. This note is published as an Annexure in Appendix II to 1951 Census Report. The portions which have relevance in the present context are reproduced in the next para.

(6.11). "The relevant censal figures relating to migrants are available for 1931, and next for 1951. The figures for 1941 have, therefore, to be estimated from those for 1931 and 1951. The abnormal migration following partition has already been considered and hence can be ignored in this context. Certain developments which are peculiar to the period complicate a reliable estimation of migrant population in 1941. Since 1931 the boundaries of States have changed. The first instalment of major changes in the boundaries took place round the year 1936. Sind was separated from Bombay, and Bihar and Orissa were formed into distinct provinces, which involved carving out certain areas from C.P., Bihar, Orissa and Madras also. The next major alteration in the boundaries of the States was effected during the period 1947 to 1950. Punjab, Bengal and Assam were partitioned, and integration of States in other areas took place. Practically, every State has thus been affected, if not by a major operation, at least by the comparatively minor event of 'mergers'. It is unnecessary to go into the details here, but it would suffice to say that a consideration of the magnitude of these changes would bring home the difficulties of estimating 1941, or as a matter of that, even 1931 migrant population corresponding to 1951 layout of States. Somehow, 1931 migrant population for 1951 layout of States was placed

together from the data given in 1931 Census Reports, but there is a big snag in this procedure, which can be well illustrated by the example of Bengal. In 1931 Census, persons born in East Bengal and enumerated in West Bengal and *vice versa* were treated as non-migrants but in 1951 Census they appear as migrants. There are no available data for correcting the figures for this change. Similar remarks apply to other areas partitioned since 1931, such as Bihar and Orissa, Bombay and Sind and so on. Apart from this, there is the further problem of estimating the migrant population of the two partitioned portions. In 1921 Census Reports, immigration and emigration figures are available in their breakdown by districts but not so in 1931 Reports, as the healthy practice was discontinued. In the circumstances, the migration figures for the combined State were split up in the ratio of the corresponding migrant population of two areas as shown in 1921 Reports. Thus, estimates of the migrant populations in 1931 for the two partitioned areas were obtained. There is yet another minor development which has to some extent affected the comparability of 1951 and 1931 migration data. In 1931, Census was one night affair on a *de facto* basis but in 1951 the censal counting was spread over 20 days. In 1931 Census, a person, who may have gone over to another place for a few days, was enumerated wherever he was found to be on the Census night, and thus treated as a migrant, whereas in 1951, he was more likely to be relegated to his normal place of residence, which in majority of cases would be his birth place also, and thus counted as a non-migrant. However, it seems improbable that this factor has much weight in affecting the final figures of migration as losses and gains may more or less balance out."

"Having obtained 1931 migration figures for 1951 layout the next hurdle is to fix the figures for 1941. There is hardly any objective data for allocating between the two decades the increase or decrease in the migrant population of a State during 1931-50. In 1941 for a few States, *viz*, Bombay, Bihar, Orissa and Madhya Pradesh only, figures of enumerated persons born outside the State were tabulated on about 1% sample basis, but the figures of immigration thus brought out for the State as a whole do not appear to be satisfactory. This is glaringly shown by the data for Madhya Pradesh, where they show practically no immigration. The information for Madhya Pradesh was ignored. This tabulation in the case of Ajmer, Delhi, Mysore, Travancore-Cochin and Hyderabad only was made for the complete count Immigration figure for 1941, where thus available, has been adopted, even though it is not considered to be satisfactory, but, without its emigration counterpart, it is not of much help. Thus, the allocation referred to above where it became necessary was made on the advice of the State Census Superintendents, who carefully considered the possibilities of any special openings for immigration to and emigration from the State having occurred during 1931-50 to justify a departure from fifty-fifty allocation-based on a steady flow of migration. On such advice 60% of the change in emigrant population shown by 1951 and 1931 census figures for Bombay State is taken to have occurred during 1941-50. In the case of Madras the ratio of allocation is 57·5%, for Assam it is 59%, for Saurashtra it is 60%, for Punjab it is 60% in the case of immigration and 50% in the case of emigration. In other cases, 1941 figures were taken to be the mean of those for 1931 and 1951. In the case of Madras, there is yet another difficulty due to the fact that a very large proportion of her emigrants have gone over to outside countries like Ceylon, Singapore, Malaya, Thailand, Indonesia, Burma etc. The number of such emigrants, being not known has been estimated at 1,692,800 in 1951 on certain rough and ready bases as against a figure of 1,032,000 in 1931." "This does not seem to fit properly with the well-known fact that these foreign countries imposed severe restrictions on immigration and that a good proportion of emigrants to foreign countries had to return to Madras during 1941-50. A net immigration change seems more likely."

"*Fresh Migration Rate.*—Migration change (*i.e.* the excess of the increase in immigrants over the increase in emigrants) during 1941-50 having been estimated as explained above, it is only necessary to make an allowance for deaths among the migrant population during the period, in order to arrive at an estimate of fresh migration in the inter-censal period. In respect of Muslim migrants, the number initially emigrated is known and hence 10% of the number gives the number of deaths among them, as the survivors to 1951 Census date

have been taken at 90% in the earlier calculations. In respect of normal migration, it would appear to be a reasonable assumption in the absence of any information to the contrary that the migrant population grew steadily from 1941 to 1951. Thus the changing migrant population can be replaced by the mean migrant population at the mid-censal point. An overall death rate may be applied to this mean population to estimate deaths in the migrant population in the next 5 years. In the calculations the death rate was uniformly taken at 20 per thousand per annum except in the cases of States in the Central India Zone, where it was taken at 25 per thousand per annum. A convenient expression for calculating fresh immigration from migration change (M. C.) (ignoring Muslim emigrants) and 1951 immigration (I_2) and emigration (E_2) figures, allowing for deaths at 20% during the decade would be as follows :—

$$(M.C) + \cdot 20 \times (I_2 - E_2) - \cdot 20 \times \tfrac{1}{2} (M.C)$$
$$= \cdot 20(I_2 - E_2) + \cdot 9(M.C)$$

Fresh migration divided by the mean of 1941 population and 1951 population (excluding displaced persons) gives the fresh migration rate. The rate is taken as positive if there be a net immigration gain and negative if a net emigration loss."

On the basis explained above, the Fresh Migration Rate per cent. (F.M.R.) for individual States during 1941-50 worked out as follows :—

Table 3

State	F.M.R. %	State	F.M.R. %
Uttar Pradesh	−1·01	Saurashtra (incl. Kutch)	−7·45
Bihar	−2·95	Madhya Pradesh	−0·17
Orissa	−1·30	Bombay	2·10
Assam (incl. Manipur)	−0·68	Madhya Bharat, Vindhya Pradesh and Bhopal.	−0·39
Madras	−1·45		
Mysore	3·16	Hyderabad	−0·29
Travancore-Cochin	0·47		

The above figures show the smallness of migration during 1941-50 even at the State level. It becomes smaller still when considered at the Zonal level. The following are the percentages of Fresh Migration during 1941-50 to the Zonal population as in 1951 :—

Table 4

State	F.M.R. %
North Zone	−0·96
East Zone (excl. West Bengal)	−1·38
South Zone	−0·79
West Zone	0·96
Central Zone	−0·36

It is obvious that the effect of migration at the Zonal level is very small, and any practicable method of allowing for it may be adopted. Refinements do not seem to be worth while.

(6.12) There seem to be two methods of allowing for migration disturbance. The first is to work out the age distribution of the natural population as at 1941 and 1951. This means adding the net emigration to and subtracting the net immigration from the age group populations as enumerated. This is the method referred to in para 8 Section IV of 1931 Actuarial Report, which was then adopted. The second method is mentioned in paras 18-20 Section II of that Report. In this method, the number of survivors of fresh migration by age groups during the intercensal period is estimated. Migration disturbance is allowed for in the Census population 1951 only in the same manner as in the first method. In either method, age distribution of migrants should be known but no proper information on this point is available. *Prima facie*, it appears that the age distribution of migrants would be materially different from that of the normal resident population. The migrants would contain a higher proportion of young adults and a lower proportion of very young children and very old persons compared to those in the resident population. In view of the smallness of migration disturbance in India, it is not insisted that data on age distribution of migrants should be collected at every Census.

In the previous actuarial investigations including the last one for 1921-30, the distribution adopted has been based on that estimated by Sir George Hardy in 1891 from the data relating to Coorg, Berar and Lower Burma, where the immigrant population was relatively very large. In the present instance, the position was no better, and no proper data on age distribution of migrants were available, inspite of a belated attempt to get some recent figures with reference to Hyderabad State. The available enumeration slips did not give an unbiassed sample of migrant population in the State, and hence, there was no alternative but to fall back on Hardy's estimates as modified by Meikle in para 25 of 1921 Report. Even granting that in India migration is a small element in the growth of population, there would be a limit to which make-beliefs should continue. An improvised estimate made in 1891 should be replaced by a recent age distribution as shown by a proper sample, which need not be very large. It is hoped that this point will be kept in mind in connection with the next investigation, and the recommendation of Ackland made in para 29 of his Actuarial Report will be implemented.

In the second method information about the amount of fresh migration has to be obtained from the statistics of birthplace , which are the only data on migration, in the manner explained in (6.11). There are no arrangements for obtaining figures which may indicate the flow of immigrants and emigrants even for the country as a whole. Of course, nothing of this kind exists in regard to internal migration between the various units. Thus, estimation of internal fresh migration is based on the change in migrant populations enumerated at two Censuses with an approximate allowance for deaths in the migrant population during the intercensal period. This allowance can be made only on certain crude assumptions as regards the rate of mortality and flow of migration. From the number of fresh migrants, the survivors to 1951 Census have to be estimated by applying the mortality rate, assuming that whole migration took place at the midcensal point. This procedure cannot be considered to be satisfactory. The first method would appear to be relatively better, since there the adjustment is based on firm figures supplied by an actual count. However, there is the point that it is impracticable to obtain the actual age distribution of the immigrants and emigrants, particularly because the whole problem of migration is of minor importance and the effort is not worth the while. It will have to be based on some small scale investigation. In the first method, the age distribution so determined is to be applied to the relatively more numerous net migrant populations at the two Censuses as against the case in the second method, where it is applied to the survivors of fresh migrant population only. Evidently, the latter is more satisfactory. On balance, the first method seems to be preferable. However, it may be appreciated that the first method means that the investigation is being made with reference to the natural population, while the second method implies that it is with reference to 1941 resident population. As migration is relatively small, the results obtained by the two methods are unlikely to differ materially. The method chosen may be selected according to convenience. However, there is a particular reason for adopting the second method this time. The estimate of migrant population as at 1941 is based mainly on guess work. It seems preferable to restrict the application of the age distribution of migrants, which is very unsatisfactory, to the smaller figure of fresh migration. Accordingly, this method was adopted to adjust the group populations for migration disturbance.

(6.2) Another practical point arose due to the fact that in the age distribution shown by the Census enumeration in India, as in the case of several other countries, there is a pronounced trough at ages 15-24. This feature persists even when the group populations are corrected for systematic bias and smoothened in the manner already explained. This leads to values of ${}_{10}p_{x+1}$ in this age sector very near 1 and in some cases to the absurd value of over 1. The trough is shown by the male and female group populations of all the Zones in 1941. A smaller trough is also shown by the age distribution of males and females in Central and Eastern Zones in 1951. The shape of the line shown by the data when plotted on a graph distinctly suggests that the trough is primarily due to under-enumeration in this age-sector. Support is lent to this suggestion by the incongruous value of ${}_{10}p_{x+1}$ coming out to be greater than 1. The shape of

the group population curves for the above Zones comes out to be what is described by Elderton as a 'twisted J-shaped curve'. This type of curve shows a sharp decline, then a distinctly less sharp decline and again a sharper decline. The portion where the decline is less sharp corresponds to the age sector 15-30, which not infrequently nears flatness. The variation in the population of the groups in this sector is rather slow. In case there is any omission in enumeration, the group population is reduced below the population of the group 10 years older as at the next census and hence a value of probability of survivance greater than one is obtained. This explains why the feature of the group population exceeding the population of the group 10 years younger as at the preceding Census is shown mostly by the age group 15-19 in the Table 5 given below. It is not obvious why 1941 distribution should show in this age sector this feature of omission. It is generally absent from 1951 data of individual States except for Madhya Pradesh, Bihar, Orissa and Assam. A *prima facie* explanation would seem to be that the Census operations were more satisfactory in 1951. This is also suggested, when considering infants enumerated in another note on "Birth Rate in 1950 Computed from Census Data". It is possible that the movement to inflate population at the time of 1941 Census may have something to do with it or the tabulation of the age data at a later date collected on a 2% basis contributed something to it. However, this feature is shown by the data of the past Censuses also. The figures given below illustrate this point :—

Table 5

GROUP POPULATION FOR 100,000 OF TOTAL FOR EACH SEX

UTTAR PRADESH

Age Group	Males			Females		
	1911	1921	1931	1911	1921	1931
15—19	8595*	8571*	9053	7561*	7455*	8772
20—24	8676	8202	9121	9289	8812	9350
25—29	8983	8611	8739	9126	8741	8901
30—34	8492	8299	7951	8839	8635	7911

BOMBAY

	Males				Females			
	1901	1911	1921	1931	1901	1911	1921	1931
15—19	9062*	8357*	7410*	8736	9251*	8003*	7110*	9190
20—24	8716*	8828*	7883*	9279	9185	9574	8752	10019
25—29	9656	9746	9692	9107	9518	9433	9346	8882
30—34	8223	8716	9195	8649	7906	8712	8776	7811

MADHYA PRADESH

	Males			Females		
	1911	1921	1931	1911	1921	1931
15—19	6790*	7067*	8807	6613*	6461*	9235
20—24	7762*	6699*	9163	9432	7726	9708
25—29	9564	7772	8571	9766	8424	8359
30—34	9409	8514	7697	9007	8799	7434

BIHAR AND ORISSA

	Males			Females		
	1911	1921	1931	1911	1921	1931
15—19	8047*	8553*	8322	7451*	7835*	8584
20—24	7262*	7148*	8517	8460*	8238	9188
25—29	8709	8419	8607	9243	8977	8936
30—34	8202	7937	8018	8446	8490	8111

MADRAS

	Females		
	1911	1921	1931
15—19	8462*	7914*	9171
20—24	9482	9382	9981
25—29	8352	8865	8950
30—34	8162	8675	7746

ASSAM

	Males			Females	
	1911	1921	1931	1911	1921
15—19	7459*	7859*	8331	8531*	9061
20—24	7422*	7141*	8754	9332	9094
25—29	9348	8994	8932	9898	9577
30—34	8598	8222	8288	8212	8090

The table given above shows the population in certain quinary age groups for a total population of 100,000 of each sex. The figures marked by an asterisk are less than the corresponding population of the age group 10 years older at the next census, although they should be considerably more. For, consider the U. P. male population in the age group 15-19 in 1921. At the next census they were enumerated in the age group 25-29, but their number is higher than what it was in 1921. To get the absolute group population, the figures shown under each year should be multiplied by the respective total population in units of lakh. The ratio r of the total population in 1931 to that in 1921 gives the growth rate, which is generally greater than unity. If figures in each quinary group under 1931 are multiplied by r, the total of groups would add up to the total population in 1931 which would correspond to a total population of 100,000 in 1921. As r is greater than unity, the quinary group population so obtained will be greater than the corresponding figure shown under 1931 in the above table, and yet the figure shown in 25-29 under 1931 exceeds the corresponding figure in the age group 15-19 in the preceding census. The above table, therefore, under-reports such incongruities. Instead of showing the absolute figures straightaway, they have been shown reduced to a total population of 100,000, in order to eliminate the effect of changes in territory, which the States have undergone during the period considered.

Kingsley Davis in Appendix C to his book 'The Population of India and Pakistan' has drawn attention to the existence of this trough in the All India group population for each sex in 1911, 1921, 1931 and 1941. There seems to be no way to correct for this feature due to omission in enumeration except by a free hand smoothing of group population curve, as was done by Kingsley Davis. The same procedure has been adopted in the present instance for correcting 1941 data. Such a correction has been necessary for 1951 in respect of East Zone only. The shape of the curve in the age sector in 1951 gave a very good guidance in frechand smoothing. It may be pointed out that, whatever the method of calculating mortality rates be, it is necessary to correct the data for such omissions as best as the circumstances permit, for no subsequent mathematical manipulation can make up for an omission, unless the gap is filled up.

7. **Calculation of p_x for ages 5—60.**

(7.0) Having obtained value of ${}_{10}p_{x+\frac{1}{2}}$ where x stand for 5, 10, 15 etc. *i.e.* at quinquennial interval, the values of p_x may be calculated in any convenient manner. One way is suggested by the method adopted in the Egyptian life table. Starting with a radix $l_{5\frac{1}{2}}=1,00,000$, a series A of values of $l_{15\frac{1}{2}}$, $l_{25\frac{1}{2}}$ etc. at 10 years' interval is obtained by successively multiplying by ${}_{10}p_{x+\frac{1}{2}}$. If $l_{15\frac{1}{2}}$ or any similar value in the series can be fixed, a series B of values of $l_{20\frac{1}{2}}$, $l_{30\frac{1}{2}}$ etc. is obtained. The two series A and B can be suitably dovetailed into each other. This can be done by interpolating values at mid-points in series A, which gives $l_{x+\frac{1}{2}}$ for x=10, 20, 30 etc. Using any one of the values so obtained, say, the value for x=10, the series B yields another set of values of $l_{x+\frac{1}{2}}$ for x=20, 30, 40 etc. To give equal importance to both the series, values at mid-points in series B may be interpolated. Thus, there will be two sets of values of $l_{x+\frac{1}{2}}$ at quinquennial ages, and the mean of the two values may actually be adopted. With values of $l_{x+\frac{1}{2}}$ known at quinquennial interval, the values for individual ages may be calculated by osculatory interpolation. The resulting rates of mortality would not be smooth enough, so that their graduation would be necessary. As the primary objective is to get smoothly running rates of mortality, it seems preferable to obtain smooth rates of p_x directly from ${}_{10}p_x$ and to obtain value of l_x therefrom. Hence, the second method as described in (7.1) has actually been adopted.

(7·1) $\text{Log}_{10}p_x$ may be reduced to $\log_5 p_x$ by the following relationship :—

$$\tfrac{1}{4}(\log_{10}p_z+\log_{10}p_{z+5})$$

$$=\tfrac{1}{4}\left(\sum_{t=0}^{4}\log p_{z+t}+2\sum_{t=5}^{9}\log p_{z+t}+\sum_{t=10}^{14}\log p_{z+t}\right)$$

$$=\sum_{t=5}^{9}\log p_{z+t} \text{ approximately.}$$

$$=\log {}_5p_x$$

From the quinquennial group totals, individual values of $\log p_z$ may be obtained by applying Dr. Kozakiewicz's osculatory interpolation formulae given in the Appendix. Antilogarithm of the interpolated values gives the probabilities of surviving one year for individual half-ages. An explanation seems necessary in connection with the approximation, which will be recognised

to be based on the same consideration as when taking a weighted average in connection with the smoothing of group populations. In the age range 5—60 to which the above approximation is applied, p_z first increases slowly to a maximum somewhere in the range 15-20, and thereafter steadily declines during the remaining period. The variation in ${}_5p_z$, which is the product of five successive values of p_z, is smaller, which is further reduced, when considering the function $\log_5 p_z$. In taking the above approximation an error given by $\frac{1}{4}\triangle^2 \log_5 p_{z=5}$ is introduced, assuming that the values of $\log_{10} p_z$ are already smooth. $\text{Log}_5 p_z$ is montonically increasing or decreasing slowly throughout the range except near the peak point. Thus, first difference would be of the same sign and changing slowly so that $\frac{1}{4}\triangle^2$ would be negligibly small for the whole range except perhaps at the peak point. At this point, the first difference on either side is of opposite sign, which may lead to a value of $\triangle^2$ higher than that of the first difference. The greatest error may be expected to be introduced at the peak point by this process of approximation if the smoothing effect due to the removal of random variations in $\log {}_{10}p_z$ is entirely ignored.

The extent of the possible maximum error introduced by this approximation may be illustrated by the following figures calculated from the rates obtained for All-India Males. Column (3) shows the value of $\frac{1}{4}\triangle^2 \log {}_5p_{x-4\frac{1}{2}}$, which gives the value of theoretical error possible.

Table 6

Age x	$\log {}_5p_{x+\frac{1}{2}}$	Error	% col. (3) / col. (2)
1	2	3	4
5	—.0329	...	...
10	—.0255	—.0011	4.3
15	—.0244	—.0013	5.3
20	—.0246	—.0004	1.6
25	—.0283	—.0005	1.8
30	—.0340	—.0002	0.6
35	—.0407	—.0004	1.0
40	—.0491	—.0012	2.4

The error in $\log p_{x+\frac{1}{2}}$ will be roughly 1/5 of the percentage given in col. (4), since

$$\log {}_5p_{x+\frac{1}{2}} = \sum_{t=0}^{4} \log p_{x+t+\frac{1}{2}}$$

Now, $\log p_z = \log(1-q_z) = -q_z$, ignoring higher powers of q_z. Thus, the error in $\log p_{x+\frac{1}{2}}$ gives a good indication of the possible error introduced in the rates of mortality derived on the basis of this approximation.

Values of p_x for integral ages upto 60 are obtained by visual interpolation as was done in the case of A 1924-29 Table.

8. Extension to ages over 60 and below 5.

(8·0) To derive values of p_x for ages beyond 60, a Gompertz curve was fitted at ages 45, 50, 55 and 60 by the method of moments using the relation

$$\text{colog } {}_cp_x = Bc^x$$

Hence, $\log(\text{colog } p_x) = \log B + x \log c$.
The original values between 45 to 60 fitted well with those calculated from the Gompertz curve. To improve on the smoothness of the junction in a few cases the two series, were blended by taking varying proportions of the values of p_x in the two series. Having thus got the values of p_x for ages 5 and over, the number living at the various ages may be calculated, by taking radix $l_5 = 1{,}00{,}000$.

(8·10) Values of l_x are projected for values of x below age 5 by the equation

$$l_x = A + Hx + Bc^x + \frac{m}{nx+1}$$

This equation has been used in the past for compiling life table portion for the very early ages, in the absence of any direct data which may yield reliable mortality rates at these ages. The recorded population at these ages are not reliable and cannot be used for deducing rates of mortality. There is also the theoretical consideration discussed in a para (4·1), viz. the rates below age 10 thus obtained would relate to the experience of a few years of the intercensal period. Hardy adopted the rates of mortality recorded for ages 0—12 during 1876-1900 in respect of Proclaimed Clans in Uttar Pradesh for the relevant rates in his Tables for India. In the Clans infanticide was prevalent and there was a strict legal supervision over births and deaths at the earlier ages of life among them. Hardy prepared a mortality table for ages 0—12 from these data and employed the above equation to deduce adjusted numbers living. The equation reproduced the original figures remarkably well. In the above equation, c was taken to be 0·65 and n=20. Ackland adopted the equation keeping the values of c and n to

be the same but varying the value of other constants as necessary, so that the values of l_x calculated from this equation for early ages starting from o made a smooth junction with those already deduced for higher ages. Meikle did not consider it desirable to attempt estimation of rates of mortality below age 5, owing to the lack of any data. Vaidyanathan deduced all the rates of mortality above age o by his main method. He employed the above equation to get for Burma only q_0, the rate of mortality at age o. He found the value c=·65 to be too high for his purpose and took it as ·45, raising n to 29·8125 as the most suitable value. The other constants were chosen in such a way that the values of l_1, l_2, l_3 and l_4 deduced from the above equation would reproduce q_1, q_2, q_3 as already obtained. The values of q_0 for the other Provincial groups were obtained graphically using the values for the first five ages for Burma as base. In the above equation for a radix l_0 =100,000 Hardy took A=53,675, H=—492, B=24,610, m=21,715. The value of B adopted by Meikle and Vaidyanathan are not very different. From the size of the values of B and c, it appears that the role of the term Bc^x is to regulate largely the element of extra mortality in childhood. As age increases, this term is multiplied by a positive fraction near about half and this makes for a rapid fall in l_x in childhood ages. By the time x=10, this term becomes small and is, therefore, ineffective in controlling variation in l_x with age. As explained by Vaidyanathan in para 37 Section IV of 1931 Actuarial Report, the above equation is an adaptation of Makeham's formula. The term $\frac{m}{nx+1}$ has been added to provide for the higher infant mortality. The term drops down sharply at age 1 and is small at the subsequent ages. By the age of 5, it becomes relatively negligible. The derivation of the values of c, m and n this time is based on the above interpretation of their roles.

(8·11) From life tables given in the Demographic Year Book of the U.N.O. those, which show heavy mortality in the early years of life, such as is the characteristic of Indian experience, were selected and the average rates of mortality at ages, 1, 2, and 3 were obtained from them. The life tables, which were thus included, related to Egypt (1936-38), Mauritius (1942-46), Gautamala (1939-41), Chile (1940), Japan (1921-25), Bulgaria (1899-1902), Thailand (1937-38), Finland (1901-10), Hungary (1920-21), Italy (1901-11), and U.S.S.R. (1896-97). The average values of q_x thus obtained are given below :—

Table 7

Age	Value of q_x	
	Males	Females
1	2	3
0 . .	.2095	.1767
1 . .	.0736	.0728
2 . .	.0404	.0405
3 . .	.0237	.0235

As c is not desired to be connected with infant mortality, q_0 was not taken into account and values of l_x for x=1, 2, 3 and 4 were obtained with radix l_1 =10,000. The equation $l_x = A + Hx + Bc^x$ was fitted to these values to determine the value of c. For males c came out to be 0·450 and for females the value was 0·474. These values have been adopted in the calculation here.

(8·12) The values of A, H and B have been determined separately for males and females in each life table by fitting the equation $l_x = A + Hx + Bc^x$ to the value of l_5, l_6 and l_7 already obtained. Based on this equation, values of l_x for x=0, 1,..... 4 were calculated. To these values, the value of $\frac{m}{nx+1}$ has been added, to get the number surviving, l_x, for ages below 5. For this purpose n is taken as 20, so that by the age 5 the additive term becomes negligible. The equation is already satisfied by the values of l_5, l_6 and l_7 and this ensures a smooth junction of l_x below age 5 with those already obtained for 5 and over. The value of m to be adopted for the above purpose is determined as explained in the next para.

(8·13) Owing to omissions in the registration of births and deaths in India, the registered infant mortality rate is considered to be understated. From the fact that infant mortality rate is a ratio of births and infant deaths, which are both affected by omissions in registration, and considering the level of under registration in the various parts of the country, it seems

unlikely that the true infant mortality rate in State is more than double the recorded rate. The point is discussed in the following passage eproduced from another note on 'Birth Rate in 1950 Computed from Census Data' :

"Let the birth registration efficiency as shown by the proportion of registered births to the actual births be p, and a similar infant death registration efficiency, represented by the proportion of registered infant deaths to the actual infant deaths, be q. Obviously, each of p and q is less than unity. Further, let B and D be registered births and infant deaths in a year and b and d be their true values.

Then, B=pb and D=qd.

Observed infant mortality rate

$$=I=\frac{D}{B}=\frac{q}{p}\frac{d}{b}=\frac{iq}{p}\ldots.(i)$$

where 'i' is the true infant mortality rate.

It is well known that circumstances which lead to the omission of births from being registered are stronger for the omission of infant deaths from being registered. Thus, p is greater than q. From relation (i), it then becomes obvious that the true infant mortality rate 'i' is higher than the observed value I. Let the true rate of infant mortality be K times the observed rate. The ratio K is given by the relative proportions of birth and infant death registrations.

The following table shows for the various values of K, the permissible percentage omission in infant death registration against the different levels of birth registration efficiency :—

Table 8

Birth registration efficiency	Percentage omissions in births	Upper limit of percentage omission in infant deaths when				
		K=5/4	K=3/2	K=2	K=3	K=4
0·8	20	36	47	60	73	80
0·6	40	52	60	70	80	85
0·5	50	60	67	75	83	87
0·4	60	68	73	80	87	90
0·2	80	84	87	90	93	95

There seems to be no evidence for fixing K objectively but from the above limits, it seems reasonable to take that the true infant mortality rate is at most twice the registered rate, it may well be less."

The following table shows the registered infant mortality rate per 1000 live-births during 1941-50 along with the estimated lower, upper and values :—

Table 9

Zone	State	Male				Female			
		Registered	Lower	Upper	Probable	Registered	Lower	Upper	Probable
North	Uttar Pradesh	125	125	225	160	115	115	200	150
South	Madras	160	160	250	170	145	145	225	155
West	Bombay	158	160	250	190	146	145	225	180
East	Bihar, Orissa & Assam	126	160	250	225	113	145	225	200
Central	Madhya Pradesh	229	230	300	250	205	205	275	225
All India	Above States combined	152	160	250	190	139	145	225	175

The registered rate relates to the State or States shown against the Zone but is taken to apply to the whole Zone. The lower value is taken to be almost the same as the registered rate and the upper value is taken well within twice the lower value. Only for East Zone the lower value is taken higher than the recorded rate in view of the particularly bad state of registration in the Zone. The probable value has been fixed on a subjective guess. In the case of Bombay the probable rate is supported by the rate of 190 for both sexes combined recorded in the Sirur Health Unit during 1941—50. This unit covers a small area and is meant as a demonstration centre for health studies. In such areas, special attention is paid to the registration of births and deaths. Similar Units in U.P. and Madras show infant mortality rates of 130 and 185 respectively for both sexes combined.

The probable value has been adopted as the value of q_0 for the life table. From this value m can be calculated as follows. Let a_0 & a_1 be the values of the expression $A+Hx+Bc^x$ for x=0 and x=1 as already obtained in the manner explained in (8·12).

$$l_0 = a_0 + m ;$$

$$l_1 = a_1 + \frac{m}{21} ;$$

$$l_1 = (1-q_0)l_0.$$

These equations give

$$m = \frac{a_1 - a_0(1-q_0)}{\frac{20}{21} - q_0}$$

From the value of m thus obtained, values of l_x are got, which enable the table below age 5 to be completed. As this portion of the life table is based on an estimate of the value of q_0, it is shown in italics to indicate its tentative character. In a life table there is a general interest in the values of q_x, the rate of mortality at age x, and e°_x the expectation of life. In order to indicate the limits within which these would vary on account of a different value of infant mortality rate being adopted, values of m corresponding to the lower and the upper values of infant mortality rate were calculated. The corresponding values of l_x and from them values of q_x and e°_x were calculated. These values of q_x and e°_x are shown in Table B. The true value of q_x and e°_x would be between the values obtained for the lower and the upper value of q_x. An examination of Table B shows that the range of variation is not much and hence the specific values given in the Table are good enough for practical purposes.

(8·14) It may be desirable to mention another approach for obtaining mortality rates at very early ages, which was adopted by Kingsley Davis in constructing two abridged life tables. He estimated q_x under ten years of age by fitting regression lines to the values of q_x and $_{30}Q_{10}$ the probability of dying within 30 years after age 10, as given by a large number of different life tables of the various countries. The value of q_x corresponding to the value of $_{30}Q_{10}$ based on the Indian rates already obtained was calculated from the regression equation. He found the values so got to be too high. He obtained another estimate from the Indian rates given in 1901—10 life table by allowing for the improvement in mortality in ages under 10 shown by the registration statistics between 1901—10 and 1911—20 decades. He adopted the mean of the two estimates. An attempt was made to apply the regression method to 1951 data, and it confirmed the observation of Kingsley Davis that the values obtained are too high. Just for record, it may be mentioned that the regression line was fitted to the points taken from the available foreign life tables and the values of q_x for x=0, 1, ... 4 corresponding to the value of $_{30}Q_{10}$=0·4344 came out to be 0·3993, 0·1653, 0·0898, 0·0511, 0·0331 respectively.

9. Other functions of Life Table.

(9) From the values of p_x and l_x, the values of the functions d_x, q_x, L_x, T_x, e°_x are easily obtained in the usual manner. The values of L_x for x below 5 are obtained by the integration of the expression for l_x adopted in its calculation. For other ages, L_x is obtained by the usual method of averaging l_x and l_{x+1}. These give T_x and e°_x by the equations.

$$T_x = \sum_{t=x}^{\omega} L_t \ ; \text{ and } e^\circ_x = T_x / l_x .$$

The above equation gives complete expectation of life, which is shown as 'Mean After-life Time' in the Tables.

10. The Results—All-India Life Tables.

(10·0) While reviewing the results, it may be interesting to see how the findings of the present investigation stand in relation to similar recent studies. A direct comparison of two life tables is best made with reference to the mortality rates at the various ages, but expectation of life also is a good indicator in a nutshell of the levels of mortality represented by the rates

The latter gives a measure of the cumulative effect of mortality over the remainder of the span of life after the age at which expectation of life is considered. It need hardly be mentioned that higher the expectation of life, the lower is the level of mortality. There are two recent investigations of Indian mortality, with which the results may be mainly compared. One is by Kingsley Davis who prepared an abridged life table for India for the period 1931—40, as has already been mentioned. The other is by Vaidyanathan, who analysed the extensive data relating to insured lives of the Oriental Government Security Life Assurance Co., Ltd., during 1925—35. It is true that this experience relates to a select class very different from the general population, but it is quite helpful in broadly indicating what would be a reasonable level of the rates of mortality even in respect of the general population. The authenticity of the data makes the 'Oriental' experience a reliable guide in certain situations.

(10·10) According to Kingsley Davis's calculations complete expectation of life during 1931—40 was 32·09 for males and 31·37 for females. According to 1931 life tables, the expectation of life at birth was 26·91 for males and 26·56 for females. The present investigations indicate that in 1941—50 it was between 33·67 and 29·87 for males and probably 32·45, to give a precise figure. Similarly, the figure for females was between 32·85 and 29·62 and probably 31·66, if a definite figure is to be given. These figures clearly show a definite reduction in the mortality of each sex between the periods to which 1931 and 1951 investigations relate. However, there is no evidence of a radical change in the position. The successive reduction in the mortality level suggested by the above figures of expectation of life seems to agree well with the estimates of death rates of 36·2 and 31·2 per mile during 1921—30 and 1931—40 made by Kingsley Davis by the method of 'reverse survival' and of 27·4 during 1941—50 made by me in another note on 'Computed Birth and Death Rates during 1941—50'. This improvement in mortality is a little more significant than what the mere figures indicate. The period of 1931 investigation followed the great influenza pandemic which weeded out the weaklings, whose death would otherwise have been recorded in the period. For this reason, the period succeeding one of high mortality experienced lighter mortality and an improvement over that is more significant.

(10·11) Rates of mortality at very young ages are not entirely dependable. It may, therefore, be desirable to compare expectations of life at age 5 or preferably age 10. According to 1941—50 experience the All-India expectation of life is 40·86 for males and 40·91 for females at age 5 and 38·97 for males and 39·45 for females at age 10, and, according to 1931 Life Table 39·96 for males and 36·61 for females at age 5 and 36·38 for males and 33.61 for females at age 10. The margin of difference between the expectations of life according to the two experiences is considerably reduced in the case of males but in the case of females it continues to be substantial. The reason for this difference in the movement in the male and female expectations would be clear from the discussions in para (10·40) *et seq*. According to Kingsley Davis's calculation for 1931—40 the expectation of life is 44·02 for males and 41·69 for females at age 5 and 41·20 for males and 38·56 for females at age 10. These expectations are higher than the ones according to 1941—50 experienc except in the case of females at age 10. The main reason for this difference, as would be evident from the discussions in para (10·2), is the low mortality in 1931—40 table after age 50, which is not considered to be quite established. On the whole the conclusions reached in (10·10) by referring to expectation of life at birth would seem to remain valid.

A feature of Indian Life Tables, which arises out of the high infant mortality is that according to 1941—50 table the expectation of life at age 5 is a little over 8 years higher than that at birth. In countries like U. K. with low infant mortality the expectation of life decreases from its value at birth as age increases. This may be seen from the figures shown in Table 14. Another interesting feature of the Indian Life Tables is that the expectation of life at age 20 exceeds that at birth. According to 1941—50 Table, males who attain age 21, or females who attain age 22, may on the average expect to live as long as a new born child. This is evidently so due to the hazards of life being heavy in the early years.

(10·2) The rates of mortality below age 10 in Kingsley Davis's abridged life table for 1931—40 have been derived on a rough and ready basis, but those above age 10 are based on firm data, and may, therefore, be compared. This life table shows only ${}_nQ_x$, the probability of dying in the age period x to x+n. The following table shows Kingsley Davis's figures for this probability along with the corresponding figures derived from 1941—50 All-India Tables.

Table 10

Age Group	Male			Female		
	1941—50	1931—40	% Col. (2) / Col. (3)	1941—50	1931—40	% Col. (5) / Col. (6)
	(2)	(3)	(4)	(5)	(6)	(7)
10—19	·1059	·0958	112	·0894	·1197	75
20—29	·1130	·1182	96	·1071	·1456	73
30—39	·1556	·1504	104	·1884	·1799	105
40—49	·2212	·1986	111	·2407	·2271	106
50—59	·3493	·2751	127	·3180	·2948	108
60—69	·5481	·4071	134	·4922	·3976	124
70—79	·7736	·6620	117	·7048	·5658	125

The agreement between the two experiences is very good. The agreement is particularly close in the age sector 20—39 in males and 30—59 in females. Male mortality for 1941—50 is on the whole a little heavier than that shown by 1931—40 Table. The female mortality for 1941—50 in age group 10—30 is perceptibly lighter than that shown by 1931—40 Tables. In the latter Table female mortality in this age sector seems to be too high when compared to its male mortality. The percentage ratio of female to male mortality in the age groups 10—19, 20—29, 30—39 is 125, 123 and 120, whereas considering the maternal risk, which increases with repeated maternities and, therefore, in later ages, the female mortality relative to the male mortality should be the highest in 30—39 sector. There is also the further possibility that female mortality may have slightly improved in the age sector 10—30, since the period 1931—40. In the higher ages above 50 in males and above 60 in females, 1941—50 rates are considerably higher than those shown by 1931—40 Table. It does not seem likely that the rates of mortality in this age sector would be lower than what are given for 1941—50, in view of the rates shown by the Oriental Experience as discussed in the next para.

(10·3) The following table shows the rates of mortality at quinquennial ages according to All-India Male Life Table for 1941—50 and the Oriental Ultimate Experience (1925—35). The earliest age shown in the latter is 20.

Table 11

Age	1941—50	Oriental	% Col. (2) / Col. (3)
(1)	(2)	(3)	(4)
20	.01049	.00420	250
25	.01197	.00428	280
30	.01413	.00465	304
35	.01704	.00552	309
40	.02020	.00768	263
45	.02482	.01176	211
50	.03232	.01864	173
55	.04222	.02908	145
60	.05726	.04285	136

Oriental Experience relates to an earlier period and it is likely that the rates of mortality, had they related to the period corresponding to that of the All-India Life Table, would have been lighter. Gardner and Srinivasan have published in Journal Institute of Actuaries, LXXIV (page 389) figures showing the combined mortality experience of first class Indian male lives insured during 1934—45 with the Prudential Assurance Co., Ltd., of London and the National Insurance Co. Ltd., of Calcutta. This experience conforms to 97% of the mortality according to Oriental 1925—35 Table. This suggests that Oriental Experience may be taken to reflect the mortality of assured lives in almost the same

period as of 1941—50 life table. The run of percentages shown in col. (4) in Table 11 above appears to be reasonable. In the data relating to countries like U. K., it is found that general population mortality rates are 150% to 250% of the mortality rates shown by insured lives. It is held that the effect of medical selection in the case of Indian insured lives is short-lived and does not last beyond a year or so. However, the influence of class selection is very marked. In the above Oriental Experience, the average age at entry is 31·37, and the average duration is 4·44. For these reasons, it is to be expected that the advantage of the insured lives over the general population in regard to lighter mortality should be shown more round about the ages of 30 and 35. Although the effect of medical selection wears out soon, the influence of class selection persists and at ages over 50 the mortality of insured lives should show some such relation to the mortality of the general population as is indicated by the figures in column (4).

(10·40). Compared to 1931 All-India Life Table mortality, the All-India Life Tables for 1941—50 show a distinctly lower level of mortality. The following table shows the mortality rates at quinquennial ages according to the two experiences; as 1931 Table gives q_x to 4 places of decimals, 1941—50 rates also have been rounded up to 4 places.

Table 12

Age	Males			Females		
	1941—50 Table	1931 Table	% Col. (2) / Col. (3)	1941—50 Table	1931 Table	% Col. (5) / Col. (6)
(1)	(2)	(3)	(4)	(5)	(6)	(7)
5	·0171	·0193	89	·0206	·0165	103
10	·0131	·0079	166	·0131	·0081	162
15	·0106	·0098	108	·0084	·0115	73
20	·0105	·0127	83	·0078	·0176	44
25	·0120	·0153	78	·0114	·0216	53
30	·0141	·0193	73	·0167	·0251	67
35	·0170	·0241	71	·0214	·0293	73
40	·0202	·0294	70	·0243	·0345	70
45	·0248	·0349	70	·0274	·0390	70
50	·0323	·0410	79	·0313	·0431	73
55	·0422	·0481	88	·0375	·0475	80
60	·0573	·0579	99	·0500	·0543	92
65	·0775	·0727	107	·0665	·0666	100
70	·1044	·0976	107	·0882	·0888	100

Except for early ages 1941—50 rates are considerably lighter. The reduction in the rates for males commences from age 20, and slightly increases with age, reaching the maximum at ages 40 and 45. After these ages the magnitude of the reduction decreases and at age 60 the two rates are practically equal. At higher ages 1941—50 rates are slightly higher. In the females, the reduction is heavy in the age sector 15—25 but at higher ages the reduction follows the same pattern as in the case of males. After age 45, the decrease in the percentage reduction in female mortality is a little more gradual, so that the rates at ages 65 and 70 are practically equal to 1931 rates. Assuming that 1931 Table reflects the level of mortality prevailing in the mid-year of the decade 1921—30, the 1941—50 rates would relate to a period which may be taken to be 20 years later. On this basis, it would appear that there has been a substantial improvement over the mortality shown by 1931 All-India Tables in the age sector 20—55 both in the males and the females. In the method adopted for deriving rates of mortality, the number enumerated at one census is compared with that enumerated at the next census. If the efficiency of enumeration work increased at the latter census, the rates of mortality would come out to be lighter. It is not known whether this factor at all operated in the present instance, and if it did, to what extent. The differences in the rates of mortality below age 20 in the case

of males and below age 25 in the case of females appear to be more due to a difference in the mortality pattern than to improvement or deterioration in the level of mortality. The two differences which rather stand out in this sector are (i) the heavier male and female mortality in 1941—50 at age 10 and (ii) the much lower female mortality in 1941—50 at ages 15 to 25.

(10·41) As regards (i), it may be stated that the difference arises mainly due to the fact that in 1931 table, q_x the rate of mortality at age x, is the lowest at age 10 for males and females both, but in 1941—50 the lowest is at 18. Even the English Life Tables record the lowest mortality at about the age of 12 or 13 ; in 1931 it was at 11. In England child mortality has been brought down very much through the concerted efforts of the public and the State, but in India the mortality pattern is characterised by a heavy child mortality. About 40% of total deaths occur below age 5, although this sector accounts for a little below 14% of the total population. No doubt most of the high mortality of the sector is due to the abnormal infant deaths, but heavy child mortality contributes to it considerably. The peculiar risks, to which children in a tropical country beset with a host of infectious diseases like that we have in India are not yet over by the age of 5. The struggle between the innate vitality of the child and the nvironmental enemies continues till later. It eems more reasonable to expect that a group which has had to pass through heavier mortality would show the lightest mortality a little later than in the case of children in England, who get easier conditions of life quite early in the childhood stage. The process of improvement in the group mortality should continue till the risks of adult life arrest it. Registration statistics of death by age are not reliable guides due to the well-known defects resulting from omissions and misstatement of age, but in a broad way they seem to support the suggestion that the process of improvement in mortality continues in the age group 10—14. Owing to changes in territory, it is not easily possible to work out the age-specific mortality rates for the registration areas in India during 1941—50. The table given below, therefore, shows the proportion of deaths by ages registered in the nine Part A States during 1941—50 along with the proportionate age distribution of the population in India as at 1951 and 1941 Censuses. The figures for the two Censuses are given to show that the age distribution did not change materially during 1941—50.

Table 13

Age	% Registered deaths 1941—50	% Population 1951	% Population 1941
Under 1	19·9	13·3	13·6
1—4	17·5		
5—9	6·2	12·8	13·6
10—14	3·9	11·3	11·1
15—19	3·9	10·1	9·4
20—24	8·0	9·0	8·8
25—29		8·1	8·5
30—34	7·9	7·2	7·6
35—39		6·3	6·4
40—49	7·5	9·8	9·8
50—59	7·8	6·4	6·3
60 and over	17·4	5·7	4·9

The reduction in the proportion of deaths between ages 5—9 to 10—14 is sharper than the decline in their respective populations. This indicates that the mortality in 5—9 is much higher than that in 10—14. The proportion of deaths in the next group 15—19 is the same as in the preceding age group 10—14 while the population records a small decline, thus showing that the mortality in 15—19 is only slightly higher than that in 10—14. This trend of mortality in the age sector 5—19 indicates that the process of improvement in mortality does not finish off by age 10 but carries on further to later ages.

(10·42) In regard to (ii), the experience in the Western Countries like England and Wales and U. S. A. is that female mortality is lighter than male mortality and substantially so in a major part of the span of life. Smith in his book 'Population Analysis' says that 'very few are the exceptions to the rule that females of every age group enjoy a lower death rate than the corresponding males'. In India due to heavy maternal risk, female mortality may be heavier in the child-bearing period. It is a well known fact in genetics that the male sex starts with a certain excess in numbers at birth over females but the better stamina of the latter soon makes up for it. Indian registration statistics also show more male births than female births. The figures of registered infant mortality rates by sex shown in para (8·13) are slightly

lower for females than for males. However, there is a traditional fondness for male issues in most parts of the country and a corresponding dislike for female children. All the affection and care is bestowed on male children but female children are not much cared for. In the circumstances, it is to be expected that the slight advantage of female infants shown in a lower infant mortality rate shall soon wear itself out and that female mortality in the very young ages should be heavier than the male mortality. The survivors who live through the more difficult circumstances of tender age should ultimately show lighter mortality, which eventually should go below the corresponding male mortality. This is the pattern of mortality, which the male and female rates for 1941—50 at very young ages show. At ages 1—10 the female rate of mortality in the All-India Table is above the male rate, but at age 11 it is below the male rate. Having reached this position on the strength of their innate stamina, they would continue to show lighter mortality till they have to meet the peculiar maternity risk. Then, their mortality would again be heavier than that of the males. After the reproductive period, the female mortality would again become lighter than the male mortality. Extra maternal

Table

EXPECTATION OF

Country	Period	Males						
		Age 0	5	10	15	25	45	65
Netherlands	1947—49	69·4	67·4	62·7	57 9	48·5	30·0	13·9
Sweden	1941—45	67·06	95·07	60·45	55·74	46·98	29·25	13·68
England and Wales	1948	66·39	64·49	59·76	54·94	45·66	27·42	12·75
Australia	1946—48	66·07	63·77	59·04	54·28	45·04	26·83	12·25
Denmark	1941—45	65·62	65·16	60·46	55·71	46·68	28·76	13·20
New Zealand	1934—38	65·46	63·70	59·11	54·42	45·43	27·78	12·76
Canada	1947	65·18	64·43	59·79	55·07	45·95	28·03	13·25
Switzerland	1939—44	62·68	61·64	57·08	52·41	43·62	26·15	11·60
U. S. A.	1939—41	61·60	60·76	56·12	51·43	42·51	25·52	12·07
Germany	1932—34	59·86	61·70	57·28	52·62	43·83	26·61	11·87
Ireland	1940—42	59·01	60·68	56·25	51·60	43·10	26·47	12·31
France	1933—38	55·94	57·06	52·57	47·91	39·59	23·99	11·05
Finland	1941—45	54·62	55·41	51·27	46·87	39·23	23·76	11·11
Austria	1930—33	54·5	58·3	54·1	49·5	41·0	24·7	11·2
Italy	1930—32	53·76	59·68	55·46	50·98	42·69	26·37	11·92
Japan	1947	50·06	53·61	49·49	44·93	37·60	23·12	10·16
U. S. S. R. (in Europe)	1926—27	41·93	54·72	51·65	47·34	39·46	24·41	12·07
Egypt	1936—38	35·65	49·75	46·86	43·53	36·35	22·71	10·47
India	1941—50	32·45	40·86	38·97	36·24	29·78	17·63	8·18

risk starts after age 20, for it is mainly associated with late first maternities or frequent maternities. In my paper 'A Study on birth Order Statistics of India' published in the Indian Journal Medical Research (No. 39, April 1951) it is shown that in India the first births are largely concentrated in the age period 15—24, that births in 15—19 are mainly first births, and that the number of births in 15—19 is only 155 for 1,000 married women. In 1931, the proportion of married women in 15—19 was 84%, which means that per 1,000 women in 15—19 the number of births is only 130. These facts point to the conclusion that the females should experience a mortality heavier than that for the males after age 20, say near about 25. The female mortality shown by 1941—50 tables seems to conform to the pattern described here.

(10·5) The table given below shows the expectation of life at various ages in other countries according to the latest figures available in the Demographic Year Book, 1951, issued by the U.N.O. The countries are arranged in the descending order of their expectation of life at birth for Males. It is sad to find that India still figures at the bottom at all ages. Egypt is our nearest neighbour in this respect but is still considerably better off at all ages.

14

LIFE AT VARIOUS AGES.

Females						
0	5	10	15	25	45	65
71·5	69·0	64·1	59·3	49·7	31·1	14·4
69·71	67·12	62·40	57·62	48·52	30·53	14·33
71·15	68·75	63·94	59·11	49·84	31·52	15·26
70·63	67·91	63·11	58·27	48·74	30·45	14·44
67·70	66·27	61·52	56·72	47·46	29·44	13·55
68·45	66·10	61·45	56·69	47·48	29·70	13·91
69·05	67·52	62·78	57·99	48·73	30·61	14·65
66·96	65·26	60·62	55·89	46·79	28·93	13·10
65·89	64·43	59·73	54·97	45·87	28·46	13·57
62·81	63·56	59·09	54·39	45·43	28·02	12·60
61·02	61·43	56·94	52·35	43·99	27·56	13·19
61·64	61·99	57·50	52·91	44·59	27·99	13·10
61·14	61·61	57·42	52·98	44·95	28·51	13·10
58·5	61·2	57·0	52·4	43·8	27·0	12·1
56·00	61·37	57·15	52·67	44·47	28·00	12·66
53·96	57·45	53·31	48·81	41·48	26·52	12·22
46·79	58·79	55·72	51·45	43·54	28·29	13·82
41·48	58·33	54·47	50·11	42·09	27·12	12·78
31·66	40·91	39·45	36·56	29·30	18·61	9·29

(10·6) It will be interesting to mark the trend in mortality shown by the various Indian Life Tables, and to see how the position revealed by the latest compares with that in certain other important countries. Besides expectation of life, it would be interesting to find out the percentage of persons born which survives to age 20 and the age to which half the number survives. The latter figures indicate the relative incidence of mortality in the early years of life and have an important demographic and sociological significance. It would be enough to show the above data with reference to males. The table given below shows the relevant figures. Indian data for 1911—20 and 1931—40 are taken from the abridged life tables prepared by Kingsley Davis.

Table 15

Country	Period	e^0_0	e^0_{10}	Per cent surviving to age 20	Age to which 50% survived
(1)	(2)	(3)	(4)	(5)	(6)
India	1881—90	24·6	35·5	46·6	14
	1891—1900	23·6	34·7	45·2	12
	1901—10	22·6	33·4	43·8	10
	1911—20	18·9	29·1	37·9	7
	1921—30	26·9	36·4	51·2	22
	1931—40	32·1	41·2	55·6	28
	1941—50	32·5	39·0	57·9	32
England & Wales	1948	66·4	59·8	94·2	70
New Zealand	1934—38	65·5	59·1	94·6	70
Australia	1946—48	66·1	59·0	92·2	70
U. S. A.	1939—41	61·6	56·1	91·6	67
Italy	1930—32	53·8	55·5	79·7	65
Japan	1947	50·1	49·5	81·1	59
Egypt	1936—38	35·7	46·9	55·1	35

The figures show that the latest Indian mortality experience is comparatively lighter in early years, but is yet far behind other countries. The heavy waste of human lives in the early years has an important bearing on India's economic and social development.

11 Zonal Life Tables.

(11·0) For the sake of comparison, the following table shows the expectation of life and rates of mortality in 1941—50 for the various Zones.

Table 16

Zone	e^0_0	e^0_5	$1000q_{10}$	$1000q_{20}$	$1000q_{30}$	$1000q_{40}$
(1)	(2)	(3)	(4)	(5)	(6)	(7)
			Males			
Central	25·55	37·30	1·766	1·292	1·521	2·211
East	28·15	38·19	1·796	1·140	1·440	2·272
West	31·33	40·27	1·212	0·813	1·425	2·524
North	34·00	41·33	1·217	1·046	1·457	1·767
South	36·22	44·26	1·051	0·901	1·298	1·618
All-India	32·45	40·86	1·308	1·049	1·413	2·020
			Females			
Central	25·69	38·54	1·587	0·863	1·817	2·409
East	27·41	36·63	1·915	1·026	1·824	2·937
West	30·93	39·89	1·156	0·837	1·875	2·682
North	34·36	42·04	1·126	0·610	1·675	2·492
South	37·23	45·47	0·933	0·632	1·323	1·848
All-India	31·66	40·91	1·310	0·784	1·673	2·428

The function e°_{5}, expectation of life at age 5, enables the mortality levels of the Zonal life tables above age 5 to be compared. These values show that the sequence in which the Zones are placed according to the descending order of their mortality level is as given in the table. Only the Central Zone Females show a level lighter than that of East Zone Females. The rates of mortality at decennial ages, considered collectively, bring out the same order of the Zones. As has already been stated in para (10·41) mortality in 0-5 accounts for nearly 40% of the total deaths, and, therefore, the level of mortality in a Zone is more properly fixed by referring to the expectation of life at birth. The arrangement of the Zones remains the same even on the basis of the value of e°_{0}. Incidentally, Central Zone Female mortality comes out to be heavier than that of the East Zone Female. The reason obviously is that mortality below 5 has changed the balance. The above table indicates that the mortalities of the Central and the East Zones are heavier and those of North and South Zones lighter than that of All-India. West Zone has a mortality slightly lighter than that of All-India. Madras has been noted in the previous investigations also to show substantially lighter mortality compared to other Indian Provinces excluding Burma. The territorial set up of the Zones is substantially different from that of the Provincial Groups, for which life tables were prepared for 1931. There is, therefore, not much interest in comparing the present Zonal Tables with the previous similar life tables.

(11·1) Some evidence is available from independent sources about the levels of mortality in the Zones. In my note on 'Computed Birth and Death Rates during 1941-50,' an estimate of the crude death rates in the States during 1941-50 has been made by the method of differencing census populations in 1941 and 1951. Further, there is the crude death rate based on the registration data relating to Part A States, which cover a major part of the Zones. There are omissions in the registration of deaths but there is some idea of the extent of such omissions so that it is possible to form an idea of relative levels of mortality in the Zones from the recorded crude death rates. These data are shown in the following table :—

Table 17

Zone	Computed death Rate % (1941-50)	Registration Death Rate (1941-50)	(1931-40)	(1921-30)	Percentage Omission (1926-30)
(1)	(2)	(3)	(4)	(5)	(6)
Central	34·7	30·3	31·9	31·8	7·1
East	28·2	16·9	22·3	25·0	30·1
West	24·9	22·6	25·1	26·7	22·8
North	27·2	16·5	21·9	25·6	25·4
South	21·8	20·6	22·3	22·1	16·1

In the above table Registration Death Rates relate to Madhya Pradesh in Central India, to Bihar, Orissa and Assam in East Zone, to Bombay in West Zone, to U. P. in North Zone and to Madras in South Zone. Percentage omission figures are taken from Kingsley Davis's estimate of omissions in birth registration based on the data relating to the period 1926-30. The percentage for Bihar and Orissa is given as 22·3, for Orissa 41·6 and Assam 45·6. These were applied to the figures of registered births in 1921-30 to arrive at the corresponding figure of percentage omission for East Zone as a whole. The percentage omission in the registration of death may be slightly less but are not likely to differ materially. There is little likelihood of the percentages for recent years standing at lower figures. If anything, they may have gone up as is shown in the note on 'Computed Birth and Death Rates during 1941-50' referred to above. The rates shown in the above table leave little doubt that mortality is the highe

in the Central Zone and the lowest in the South Zone. Considering the extent of omission in the East Zone, which is otherwise known to be fairly correct, the place of East Zone as next to Central Zone as regards level of mortality seems to be established. The evidence in regard to the relative position of West and North Zones is not so conclusive. Computed death rate would place North Zone above West Zone, but registered death rate would seem to indicate a reverse order, considering that the extent of omission is more or less of the same order in the two Zones.

12. Acknowledgements.

In the end, I would like to take this opportunity of placing on record my sense of gratitude to the staff, who extended me devoted and ungrudging assistance, and thus helped me greatly in completing the present investigations in connection with the Age Tables, Life Tables and Computed Birth and Death Rates in a short time. In this connection, particular mention may be made of Shri P. C. Mathur, Actuarial Investigator and Shri Shadi Lal, Statistical Assistant, to whom special thanks are due. It is difficult to acknowledge individually the encouragement I received from many kind friends in carrying through the work.

APPENDIX

Dr. KOZAKEIWICZ'S Osculatory Interpolation Formulae.

10,000 U_0=	$3616W_0$	$-2768W_5$	$+1488W_{10}$	$-336W_{15}$		(*a*)
10,000 U_1=	$2640W_0$	$-960W_5$	$+400W_{10}$	$-80W_{15}$		(*b*)
10,000 U_2=	$1840W_0$	$+400W_5$	$-320W_{10}$	$+80W_{15}$		(*c*)
10,000 U_3=	$1200W_0$	$+1360W_5$	$-720W_{10}$	$+160W_{15}$		(*d*)
10,000 U_4=	$704W_0$	$+1968W_5$	$-848W_{10}$	$+176W_{15}$		(*e*)
10,000 U_5=	$336W_0$	$+2272W_5$	$-752W_{10}$	$+144W_{15}$		(*f*)
10,000 U_6=	$80W_0$	$+2320W_5$	$-480W_{10}$	$+80W_{15}$		(*g*)
10,000 U_7=	$-80W_0$	$+2160W_5$	$-80W_{10}$			(*h*)
10,000 U_8=	$-160W_0$	$+1840W_5$	$+400W_{10}$	$-80W_{15}$		(*i*)
10,000 U_9=	$-176W_0$	$+1408W_5$	$+912W_{10}$	$-144W_{15}$		(*j*)
10,000 U_{10}=	$-128W_0$	$+848W_5$	$+1504W_{10}$	$-240W_{15}$	$+16W_{20}$	(*k*)
10,000 U_{11}=	$-16W_0$	$+145W_5$	$+2218W_{10}$	$-409W_{15}$	$+62W_{20}$	(*l*)
10,000 U_{12}=	$66W_0$	$-344W_5$	$+2256W_{10}$	$-344W_{15}$	$+66W_{20}$	(*m*)
10,000 U_{13}=	$62W_0$	$-409W_5$	$+2218W_{10}$	$+145W_{15}$	$-16W_{20}$	(*n*)
10,000 U_{14}=	$16W_0$	$-240W_5$	$+1504W_{10}$	$+848W_{15}$	$-128W_{20}$	(*o*)
10,000 U_{90}=	$-144W_{80}$	$+912W_{85}$	$+1408W_{90}$	$-176W_{95}$		(*p*)
10,000 U_{91}=	$-80W_{80}$	$+400W_{85}$	$+1840W_{90}$	$-160W_{95}$		(*q*)
10,000 U_{92}=		$-80W_{85}$	$+2160W_{90}$	$-80W_{95}$		(*r*)
10,000 U_{93}=	$80W_{80}$	$-480W_{85}$	$+2320W_{90}$	$+80W_{95}$		(*s*)
10,000 U_{94}=	$144W_{80}$	$-752W_{85}$	$+2272W_{90}$	$+336W_{95}$		(*t*)
10,000 U_{95}=	$176W_{80}$	$-848W_{85}$	$+1968W_{90}$	$+704W_{95}$		(*u*)
10,000 U_{96}=	$160W_{80}$	$-720W_{85}$	$+1360W_{90}$	$+1200W_{95}$		(*v*)
10,000 U_{97}=	$80W_{80}$	$-320W_{85}$	$+400W_{90}$	$+1840W_{95}$		(*w*)
10,000 U_{98}=	$-80W_{80}$	$+400W_{85}$	$-960W_{90}$	$+2640W_{95}$		(*x*)
10,000 U_{99}=	$-336W_{80}$	$+1488W_{85}$	$-2768W_{90}$	$+3616W_{95}$		(*y*)

TABLES

Tables A—Life Tables

ALL-INDIA—MALES

Life Table (1941-50)

Age	Living at age x	Dying between ages x and x+1	Mortality rate	Survivance rate	Living between ages x and x+1	Living above age x	Mean after life time at age x
x	l_x	d_x	q_x	p_x	L_x	T_x	e°_x
1	2	3	4	5	6	7	8
0	*142,759*	*27,124*	*·19000*	*·81000*	*123,143*	*4,032,557*	*32·45*
1	*116,635*	*7,059*	*·06104*	*·93896*	*111,889*	*4,509,414*	*39·00*
2	*108,576*	*3,960*	*·03648*	*·96352*	*106,591*	*4,397,525*	*40·50*
3	*104,616*	*2,610*	*·02495*	*·97505*	*103,392*	*4,290,934*	*41·02*
4	*102,006*	*2,006*	*·01967*	*·98033*	*101,122*	*4,187,542*	*41·05*
5	100,000	1,710	·01710	·98290	99,145	4,086,420	40·86
6	98,290	1,592	·01620	·98380	97,494	3,987,275	40·57
7	96,698	1,483	·01534	·98466	95,957	3,889,781	40·23
8	95,215	1,383	·01452	·98548	94,523	3,793,824	39·84
9	93,832	1,293	·01378	·98622	93,186	3,699,301	39·42
10	92,539	1,210	·01308	·98692	91,934	3,606,115	38·97
11	91,329	1,136	·01244	·98756	90,761	3,514,181	38·48
12	90,193	1,072	·01189	·98811	89,657	3,423,420	37·96
13	89,121	1,016	·01140	·98860	88,613	3,333,763	37·41
14	88,105	967	·01098	·98902	87,621	3,245,150	36·83
15	87,138	927	·01064	·98936	86,674	3,157,529	36·24
16	86,211	892	·01035	·98965	85,765	3,070,855	35·62
17	85,319	867	·01016	·98984	84,886	2,985,090	34·99
18	84,452	852	·01009	·98991	84,026	2,900,204	34·34
19	83,600	858	·01026	·98974	83,171	2,816,178	33·69
20	82,742	868	·01049	·98951	82,308	2,733,007	33·03
21	81,874	881	·01076	·98924	81,433	2,650,699	32·38
22	80,993	898	·01109	·98891	80,544	2,569,266	31·72
23	80,095	913	·01140	·98860	79,639	2,488,722	31·07
24	79,182	924	·01167	·98833	78,720	2,409,083	30·43
25	78,258	937	·01197	·98803	77,789	2,330,363	29·78
26	77,321	952	·01231	·98769	76,845	2,252,574	29·13
27	76,369	971	·01271	·98729	75,883	2,175,729	28·49
28	75,398	991	·01314	·98686	74,903	2,099,846	27·85
29	74,407	1,013	·01361	·98639	73,900	2,024,943	27·21
30	73,394	1,037	·01413	·98587	72,876	1,951,043	26·58
31	72,357	1,061	·01466	·98534	71,826	1,878,167	25·96
32	71,296	1,084	·01520	·98480	70,754	1,806,341	25·34
33	70,212	1,109	·01579	·98421	69,658	1,735,587	24·72
34	69,103	1,135	·01643	·98357	68,535	1,665,929	24·11
35	67,968	1,158	·01704	·98296	67,389	1,597,394	23·50
36	66,810	1,179	·01765	·98235	66,220	1,530,005	22·90
37	65,631	1,201	·01830	·98170	65,031	1,463,785	22·30
38	64,430	1,219	·01892	·98108	63,820	1,398,754	21·71
39	63,211	1,234	·01952	·98048	62,594	1,334,934	21·12
40	61,977	1,252	·02020	·97980	61,351	1,272,340	20·53
41	60,725	1,271	·02093	·97907	60,089	1,210,989	19·94
42	59,454	1,287	·02165	·97835	58,811	1,150,900	19·36
43	58,167	1,311	·02254	·97746	57,511	1,092,089	18·78
44	56,856	1,344	·02363	·97637	56,184	1,034,578	18·20
45	55,512	1,378	·02482	·97518	54,823	978,394	17·63
46	54,134	1,413	·02610	·97390	53,428	923,571	17·06
47	52,721	1,448	·02747	·97253	51,997	870,143	16·50
48	51,273	1,485	·02896	·97104	50,530	818,146	15·95
49	49,788	1,523	·03058	·96942	49,027	767,616	15·42

ALL-INDIA—MALES

Life Table (1941-50)—contd.

Age	Living at age x	Dying between ages x and x+1	Mortality rate	Survivance rate	Living between ages x and x+1	Living above age x	Mean after life time at age x
x	l_x	d_x	q_x	p_x	L_x	T_x	e°_x
1	2	3	4	5	6	7	8
50	48,265	1,560	·03232	·96768	47,485	718,589	14·89
51	46,705	1,597	·03420	·96580	45,907	671,104	14·37
52	45,108	1,632	·03618	·96382	44,292	625,197	13·86
53	43,476	1,659	·03815	·96185	42,646	580,905	13·36
54	41,817	1,678	·04013	·95987	40,978	538,259	12·87
55	40,139	1,695	·04222	·95778	39,291	497,281	12·39
56	38,444	1,725	·04488	·95512	37,582	457,990	11·91
57	36,719	1,752	·04771	·95229	35,843	420,408	11·45
58	34,967	1,773	·05071	·94929	34,081	384,565	11·00
59	33,194	1,789	·05389	·94611	32,299	350,484	10·56
60	31,405	1,798	·05726	·94274	30,506	318,185	10·13
61	29,607	1,801	·06084	·93916	28,707	287,679	9·72
62	27,806	1,797	·06464	·93536	26,908	258,972	9·31
63	26,009	1,786	·06866	·93134	25,116	232,064	8·92
64	24,223	1,767	·07294	·92706	23,339	206,948	8·54
65	22,456	1,740	·07745	·92255	21,586	183,609	8·18
66	20,716	1,704	·08224	·91776	19,864	162,023	7·82
67	19,012	1,661	·08732	·91268	18,182	142,159	7·48
68	17,351	1,609	·09268	·90732	16,547	123,977	7·15
69	15,742	1,549	·09837	·90163	14,968	107,430	6·82
70	14,193	1,482	·10439	·89561	13,452	92,462	6·51
71	12,711	1,408	·11074	·88926	12,007	79,010	6·22
72	11,303	1,328	·11745	·88255	10,639	67,003	5·93
73	9,975	1,243	·12455	·87545	9,354	56,364	5·65
74	8,732	1,153	·13204	·86796	8,156	47,010	5·38
75	7,579	1,061	·13994	·86006	7,049	38,854	5·13
76	6,518	967	·14827	·85173	6,034	31,805	4·88
77	5,551	872	·15705	·84295	5,115	25,771	4·64
78	4,679	779	·16630	·83370	4,290	20,656	4·41
79	3,900	687	·17603	·82397	3,556	16,366	4·20
80	3,213	599	·18627	·81373	2,914	12,810	3·99
81	2,614	516	·19703	·80297	2,356	9,896	3·79
82	2,098	438	·20834	·79166	1,879	7,540	3·59
83	1,660	366	·22019	·77981	1,477	5,661	3·41
84	1,294	301	·23260	·76740	1,143	4,184	3·23
85	993	244	·24562	·75438	871	3,041	3·06
86	749	195	·25922	·74078	652	2,170	2·90
87	554	152	·27343	·72657	478	1,518	2·74
88	402	117	·28826	·71174	343	1,040	2·59
89	285	87	·30373	·69627	242	697	2·45
90	198	64	·31978	·68022	166	455	2·30
91	134	46	·33650	·66350	111	289	2·16
92	88	32	·35384	·64616	72	178	2·02
93	56	21	·37181	·62819	46	106	1·89
94	35	14	·39039	·60961	28	60	1·71
95	21	9	·40957	·59043	16	32	1·52
96	12	6	·42932	·57068	9	16	1·34
97	6	3	·44964	·55036	5	7	1·17
98	3	2	·47046	·52954	2	2	0·67
99	1	1	·49176	·50824	..	..	..

ALL—INDIA—FEMALES

Life Table (1941-50).

Age	Living at age x	Dying between ages x and x+1	Mortality rate	Survivance rate	Living between ages x and x+1	Living age above x	Mean after life time at age x
x	l_x	d_x	q_x	p_x	L_x	T_x	e°_x
1	2	3	4	5	6	7	8
0	*146,896*	*25,707*	*·17500*	*·82500*	*130,236*	*4,651,072*	*31·66*
1	*121,189*	*9,741*	*·08038*	*·91962*	*115,899*	*4,520,836*	*37·30*
2	*111,448*	*5,465*	*·04904*	*·95096*	*108,562*	*4,404,937*	*39·52*
3	*105,983*	*3,465*	*·03269*	*·96731*	*104,216*	*4,296,375*	*40·54*
4	*102,518*	*2,518*	*·02456*	*·97544*	*101,279*	*4,192,159*	*40·89*
5	100,000	2,058	·02058	·97942	98,971	4,090,880	40·91
6	97,942	1,848	·01887	·98113	97,018	3,991,909	40·76
7	96,094	1,662	·01730	·98270	95,263	3,894,891	40·53
8	94,432	1,493	·01581	·98419	93,686	3,799,628	40·24
9	92,939	1,340	·01442	·98558	92,269	3,705,942	39·87
10	91,599	1,200	·01310	·98690	90,999	3,613,673	39·45
11	90,399	1,076	·01190	·98810	89,861	3,522,674	38·97
12	89,323	968	·01084	·98916	88,839	3,432,813	38·43
13	88,355	874	·00989	·99011	87,918	3,343,974	37·85
14	87,481	793	·00907	·99093	87,085	3,256,056	37·22
15	86,688	725	·00836	·99164	86,325	3,168,971	36·56
16	85,963	668	·00777	·99223	85,629	3,082,646	35·86
17	85,295	632	·00741	·99259	84,979	2,997,017	35·14
18	84,663	621	·00733	·99267	84,352	2,912,038	34·40
19	84,042	630	·00750	·99250	83,727	2,827,686	33·65
20	83,412	654	·00784	·99216	83,085	2,743,959	32·90
21	82,758	687	·00830	·99170	82,415	2,660,874	32·15
22	82,071	729	·00888	·99112	81,706	2,578,459	31·42
23	81,342	782	·00961	·99039	80,951	2,496,753	30·69
24	80,560	843	·01046	·98954	80,139	2,415,802	29·99
25	79,717	910	·01142	·98858	79,262	2,335,663	29·30
26	78,807	980	·01244	·98756	78,317	2,256,401	28·63
27	77,827	1,051	·01350	·98650	77,302	2,178,084	27·99
28	76,776	1,118	·01456	·98544	76,217	2,100,782	27·36
29	75,658	1,183	·01563	·98437	75,066	2,024,565	26·76
30	74,475	1,246	·01673	·98327	73,852	1,949,499	26·18
31	73,229	1,304	·01781	·98219	72,577	1,875,647	25·61
32	71,925	1,355	·01884	·98116	71,248	1,803,070	25·07
33	70,570	1,392	·01973	·98027	69,874	1,731,822	24·54
34	69,178	1,426	·02062	·97938	68,465	1,661,948	24·02
35	67,752	1,447	·02136	·97864	67,029	1,593,483	23·52
36	66,305	1,457	·02198	·97802	65,577	1,526,454	23·02
37	64,848	1,462	·02255	·97745	64,117	1,460,877	22·53
38	63,386	1,469	·02317	·97683	62,651	1,396,760	22·04
39	61,917	1,469	·02373	·97627	61,183	1,334,109	21·55
40	60,448	1,468	·02428	·97572	59,714	1,272,926	21·06
41	58,980	1,465	·02484	·97516	58,248	1,213,212	20·57
42	57,515	1,461	·02541	·97459	56,784	1,154,964	20·08
43	56,054	1,459	·02602	·97398	55,325	1,098,180	19·59
44	54,595	1,456	·02667	·97333	53,867	1,042,855	19·10
45	53,139	1,453	·02735	·97265	52,413	988,988	18·61
46	51,686	1,451	·02808	·97192	50,960	936,575	18·12
47	50,235	1,449	·02884	·97116	49,511	885,615	17·63
48	48,786	1,445	·02961	·97039	48,063	836,104	17·14
49	47,341	1,440	·03042	·96958	46,621	788,041	16·65

ALL-INDIA—FEMALES

Life Table (1941-50)—contd.

Age	Living at age x	Dying between ages x and x + 1	Mortality rate	Survivance rate	Living between ages x and x+1	Living above age x	Mean after life time at age x
x	l_x	d_x	q_x	p_x	L_x	T_x	$e°_x$
1	2	3	4	5	6	7	8
50	45,901	1,438	·03133	·96867	45,182	741,420	16·15
51	44,463	1,438	·03234	·96766	43,744	696,238	15·66
52	43,025	1,440	·03346	·96654	42,305	652,494	15·17
53	41,585	1,441	·03466	·96534	40,865	610,189	14·67
54	40,144	1,445	·03600	·96400	39,421	569,324	14·18
55	38,699	1,451	·03749	·96251	37,974	529,903	13·69
56	37,248	1,455	·03907	·96093	36,520	491,929	13·21
57	35,793	1,465	·04093	·95907	35,061	455,409	12·72
58	34,328	1,491	·04342	·95658	33,583	420,348	12·25
59	32,837	1,530	·04658	·95342	32,072	386,765	11·78
60	31,307	1,564	·04996	·95004	30,525	354,693	11·33
61	29,743	1,574	·05291	·94709	28,956	324,168	10·90
62	28,169	1,578	·05601	·94399	27,380	295,212	10·48
63	26,591	1,578	·05933	·94067	25,802	267,832	10·07
64	25,013	1,571	·06280	·93720	24,228	242,030	9·68
65	23,442	1,558	·06648	·93352	22,663	217,802	9·29
66	21,884	1,540	·07038	·92962	21,114	195,139	8·92
67	20,344	1,515	·07448	·92552	19,587	174,025	8·55
68	18,829	1,484	·07880	·92120	18,087	154,438	8·20
69	17,345	1,446	·08338	·91662	16,622	136,351	7·86
70	15,899	1,402	·08816	·91184	15,198	119,729	7·53
71	14,497	1,352	·09326	·90674	13,821	104,531	7·21
72	13,145	1,296	·09860	·90140	12,497	90,710	6·90
73	11,849	1,235	·10426	·89574	11,231	78,213	6·60
74	10,614	1,170	·11024	·88976	10,029	66,982	6·31
75	9,444	1,100	·11650	·88350	8,894	56,953	6·03
76	8,344	1,027	·12310	·87690	7,831	48,059	5·76
77	7,317	952	·13004	·86996	6,841	40,228	5·50
78	6,365	875	·13734	·86266	5,927	33,387	5·25
79	5,490	797	·14504	·85496	5,092	27,460	5·00
80	4,693	719	·15306	·84694	4,333	22,368	4·77
81	3,974	643	·16181	·83819	3,653	18,035	4·54
82	3,331	569	·17082	·82918	3,046	14,382	4·32
83	2,762	497	·17994	·82006	2,514	11,336	4·10
84	2,265	431	·19029	·80971	2,049	8,822	3·89
85	1,834	369	·20120	·79880	1,650	6,773	3·69
86	1,465	311	·21229	·78771	1,309	5,123	3·50
87	1,154	259	·22444	·77556	1,025	3,814	3·31
88	895	210	·23464	·76536	790	2,789	3·12
89	685	171	·24964	·75036	600	1,999	2·92
90	514	136	·26459	·73541	446	1,399	2·72
91	378	106	·28042	·71958	325	953	2·52
92	272	82	·30147	·69853	231	628	2·31
93	190	62	·32632	·67368	159	397	2·09
94	128	45	·35156	·64844	106	238	1·86
95	83	33	·39759	·60241	66	132	1·59
96	50	23	·46000	·54000	39	66	1·32
97	27	16	·59259	·40741	19	27	1·00
98	11	8	·71738	·28262	7	8	·73
99	3	3	·79816	·20184	1	1	·33

NORTH INDIA ZONE—MALES

Life Table (1941-50)

Age	Living at age x	Dying between ages x and x+1	Mortality rate	Survivance rate	Living between ages x and x+1	Living above age x	Mean after life time at age x
x	l_x	d_x	q_x	p_x	L_x	T_x	e°_x
1	2	3	4	5	6	7	8
0	*137,598*	*22,016*	*·16000*	*·84000*	*122,618*	*4,677,975*	*34·00*
1	*115,582*	*7,116*	*·06157*	*·93843*	*111,735*	*4,555,357*	*39·41*
2	*108,466*	*3,960*	*·03651*	*·96349*	*106,408*	*4,443 622*	*40·97*
3	*104,506*	*2,566*	*·02455*	*·97545*	*103,234*	*4,337,214*	*41·50*
4	*101,940*	*1,940*	*·01903*	*·98097*	*101,019*	*4,233,980*	*41·53*
5	100,000	1,644	·01644	·98356	99,178	4,132,961	41·33
6	98,356	1,520	·01545	·98455	97,596	4,033,783	41·01
7	96,836	1,405	·01451	·98549	96,134	3,936,187	40·65
8	95,431	1,302	·01364	·98636	94,780	3,840,053	40·24
9	94,129	1,211	·01287	·98713	93,524	3,745,273	39·79
10	92,918	1,131	·01217	·98783	92,353	3,651,749	39·30
11	91,787	1,059	·01154	·98846	91,258	3,559,396	38·78
12	90,728	1,000	·01102	·98898	90,228	3,468,138	38·23
13	89,728	950	·01059	·98941	89,253	3,377,910	37·65
14	88,778	911	·01026	·98974	88,323	3,288,657	37·04
15	87,867	879	·01000	·99000	87,428	3,200,334	36·42
16	86,988	852	·00980	·99020	86,562	3,112,906	35·79
17	86,136	837	·00972	·99028	85,718	3,026,344	35·13
18	85,299	837	·00981	·99019	84,881	2,940,626	34·47
19	84,462	851	·01008	·98992	84,037	2,855,745	33·81
20	83,611	875	·01046	·98954	83,174	2,771,708	33·15
21	82,736	902	·01090	·98910	82,285	2,688,534	32·50
22	81,834	928	·01134	·98866	81,370	2,606,249	31·85
23	80,906	947	·01171	·98829	80,433	2,524,879	31·21
24	79,959	957	·01197	·98803	79,481	2,444,446	30·57
25	79,002	966	·01223	·98777	78,519	2,364,965	29·94
26	78,036	979	·01254	·98746	77,547	2,286,446	29·30
27	77,057	994	·01290	·98710	76,560	2,208,899	28·67
28	76,063	1,018	·01338	·98662	75,554	2,132,339	28·03
29	75,045	1,048	·01396	·98604	74,521	2,056,785	27·41
30	73,997	1,078	·01457	·98543	73,458	1,982,264	26·79
31	72,919	1,107	·01518	·98482	72,366	1,908,806	26·18
32	71,812	1,130	·01573	·98427	71,247	1,836,440	25·57
33	70,682	1,139	·01612	·98388	70,113	1,765,193	24·97
34	69,543	1,143	·01643	·98357	68,972	1,695,080	24·37
35	68,400	1,142	·01670	·98330	67,829	1,626,108	23·77
36	67,258	1,138	·01692	·98308	66,689	1,558,279	23·17
37	66,120	1,133	·01713	·98287	65,554	1,491,590	22·56
38	64,987	1,124	·01730	·98270	64,425	1,426,036	21·94
39	63,863	1,116	·01748	·98252	63,305	1,361,611	21·32
40	62,747	1,109	·01767	·98233	62,193	1,298,306	20·69
41	61,638	1,102	·01788	·98212	61,087	1,236,113	20·05
42	60,536.	1,102	·01820	·98180	59,985	1,175,026	19·41
43	59,434	1,122	·01888	·98112	58,873	1,115,041	18·76
44	58,312	1,169	·02005	·97995	57,728	1,056,168	18·11
45	57,143	1,226	·02145	·97855	56,530	998,440	17·47
46	55,917	1,284	·02297	·97703	55,275	941,910	16·84
47	54,633	1,349	·02469	·97531	53,959	886,635	16·23
48	53,284	1,425	·02674	·97326	52,572	832,076	15·63
49	51,859	1,511	·02913	·97087	51,104	80,104	15·04

NORTH INDIA ZONE—MALES

Life Table (1941-50)—contd.

Age	Living at age x	Dying between ages x and x+1	Mortality rate	Survivance rate	Living between ages x and x+1	Living above age x	Mean after life time at age x
x	l_x	d_x	q_x	p_x	L_x	T_x	e°_x
1	2	3	4	5	6	7	8
50	50,348	1,599	·03175	·96825	49,549	729,000	14·48
51	48,749	1,682	·03451	·96549	47,908	679,451	13·94
52	47,067	1,755	·03728	·96272	46,190	631,543	13·42
53	45,312	1,806	·03985	·96015	44,409	585,353	12·92
54	43,506	1,837	·04223	·95777	42,588	540,944	12·43
55	41,669	1,860	·04463	·95537	40,739	498,356	11·96
56	39,809	1,873	·04706	·95294	38,873	457,617	11·50
57	37,936	1,881	·04959	·95041	36,996	418,744	11·04
58	36,055	1,889	·05240	·94760	35,110	381,748	10·59
59	34,166	1,894	·05544	·94456	33,219	346,638	10·15
60	32,272	1,897	·05878	·94122	31,324	313,419	9·71
61	30,375	1,899	·06250	·93750	29,426	282,095	9·29
62	28,476	1,901	·06677	·93323	27,525	252,669	8·87
63	26,575	1,895	·07131	·92869	25,628	225,144	8·47
64	24,680	1,879	·07615	·92385	23,741	199,516	8·08
65	22,801	1,854	·08131	·91869	21,874	175,775	7·71
66	20,947	1,818	·08679	·91321	20,038	153,901	7·35
67	19,129	1,772	·09264	·90736	18,243	133,863	7·00
68	17,357	1,716	·09884	·90116	16,499	115,620	6·66
69	15,641	1,649	·10544	·89456	14,817	99,121	6·34
70	13,992	1,574	·11246	·88754	13,205	84,304	6·03
71	12,418	1,489	·11990	·88010	11,674	71,099	5·73
72	10,929	1,397	·12781	·87219	10,230	59,425	5·44
73	9,532	1,298	·13621	·86379	8,883	49,195	5·16
74	8,234	1,195	·14509	·85491	7,637	40,312	4·90
75	7,039	1,088	·15451	·84549	6,495	32,675	4·64
76	5,951	979	·16447	·83553	5,462	26,180	4·40
77	4,972	870	·17501	·82499	4,537	20,718	4·17
78	4,102	764	·18614	·81386	3,720	16,181	3·94
79	3,338	661	·19790	·80210	3,008	12,461	3·73
80	2,677	563	·21027	·78973	2,395	9,453	3·53
81	2,114	472	·22332	·77668	1,878	7,058	3·34
82	1,642	389	·23706	·76294	1,448	5,180	3·16
83	1,253	315	·25150	·74850	1,095	3,732	2·98
84	938	250	·26667	·73333	813	2,637	2·81
85	688	194	·28257	·71743	591	1,824	2·65
86	494	148	·29921	·70079	420	1,233	2·50
87	346	110	·31659	·68341	291	813	2·35
88	236	79	·33473	·66527	197	522	2·21
89	157	56	35362	·64638	129	325	2·07
90	101	38	·37321	·62679	82	196	1·94
91	63	25	·39356	·60644	51	114	1·81
92	38	16	·41462	·58538	30	63	1·66
93	22	10	·43635	·56365	17	33	1·50
94	12	6	·45872	·54128	9	16	1·34
95	6	3	·48169	·51831	5	7	1·17
96	3	2	·50520	·49480	2	2	0·66
97	1	1	·52920	·47080	...		...

NORTH INDIA ZONE—FEMALES

Life Table (1941-50)

Age	Living at age x	Dying between age x and x+1	Mortality rate	Survivance rate	Living between ages x and x+1	Living above age x	Mean after life time at age x
x	l_x	d_x	q_x	p_x	L_x	T_x	e°_x
1	2	3	4	5	6	7	8
0	*138,120*	*20,763*	*·15000*	*·85000*	*127,317*	*4,736,158*	*34·36*
1	*117,657*	*8,008*	*·06806*	*·93194*	*113,310*	*4,628,841*	*39·34*
2	*109,649*	*4,552*	*·04151*	*·95849*	*107,246*	*4,515,501*	*41·18*
3	*105,097*	*2,931*	*·02789*	*·97211*	*103,601*	*4,408,255*	*41·94*
4	*102,166*	*2,166*	*·02120*	*·97880*	*101,101*	*4,304,654*	*42·13*
5	100,000	1,793	·01793	·98207	99,104	4,203,550	42·04
6	98,207	1,623	·01653	·98347	97,396	4,104,446	41·79
7	96,584	1,463	·01515	·98485	95,853	4,007,050	41·49
8	95,121	1,265	·01330	·98670	94,489	3,911,197	41·12
9	93,856	1,172	·01249	·98751	93,270	3,816,708	40·67
10	92,684	1,044	·01126	·98874	92,162	3,723,438	40·17
11	91,640	926	·01011	·98989	91,177	3,631,276	39·63
12	90,714	820	·00904	·99096	90,304	3,540,099	39·02
13	89,894	725	·00807	·99193	89,532	3,449,795	38·38
14	89,169	646	·00724	·99276	88,846	3,360,263	37·68
15	88,523	579	·00654	·99346	88,234	3,271,417	36·96
16	87,944	522	·00594	·99406	87,683	3 183,183	36·20
17	87,422	481	·00550	·99450	87,182	3,095,500	35·41
18	86,941	469	·00540	·99460	86,707	3,008,318	34·60
19	86,472	492	·00569	·99431	86,226	2,921,611	33·79
20	85,980	524	·00610	·99390	85,718	2,835,385	32·98
21	85,456	566	·00662	·99338	85,173	2,749,667	32·18
22	84,890	618	·00728	·99272	84,581	2,664,494	31·39
23	84,272	685	·00813	·99187	83,930	2,579,913	30·61
24	83,587	763	·00913	·99087	83,206	2,495,983	29·86
25	82,824	849	·01025	·98975	82,400	2,412,777	29·13
26	81,975	937	·01143	·98857	81,507	2,330,377	28·43
27	81,038	1,026	·01266	·98734	80,525	2,248,870	27·75
28	80,012	1,118	·01397	·98603	79,453	2,168,345	27·10
29	78,894	1,211	·01535	·98465	78,289	2,088,892	26·48
30	77,683	1,301	·01675	·98325	77,033	2,010,603	25·88
31	76,382	1,385	·01813	·98187	75,690	1,933,570	25·31
32	74,997	1,457	·01943	·98057	74,269	1,857,880	24·77
33	73,540	1,510	·02053	·97947	72,785	1,783,611	24·25
34	72,030	1,544	·02144	·97856	71,258	1,710,826	23·75
35	70,486	1,568	·02225	·97775	69,702	1,639,568	23·26
36	68,918	1,589	·02306	·97694	68,124	1,569,866	22·78
37	67,329	1,601	·02378	·97622	66,529	1,501,742	22·30
38	65,728	1,597	·02430	·97570	64,930	1,435,213	21·84
39	64,131	1,581	·02465	·97535	63,341	1,370,283	21·37
40	62,550	1,559	·02492	·97508	61,771	1,306,942	20·89
41	60,991	1,530	·02508	·97492	60,226	1,245,171	20·42
42	59,461	1,514	·02546	·97454	58,704	1,184,945	19·93
43	57,947	1,520	·02623	·97377	57,187	1,126,241	19·44
44	56,427	1,534	·02718	·97282	55,660	1,069,054	18·95
45	54,893	1,551	·02826	·97174	54,118	1,013,394	18·46
46	53,342	1,566	·02935	·97065	52,559	959,276	17·98
47	51,776	1,579	·03049	·96951	50,987	906,717	17·51
48	50,197	1,591	·03169	·96831	49,402	855,730	17 05
49	48,606	1,601	·03293	·96707	47,806	806,328	16·59

NORTH INDIA ZONE—FEMALES

Life Table (1941-50)—contd.

Age	Living at age x	Dying between ages x and x+1	Mortality rate	Survivance rate	Living between ages x and x+1	Living above age x	Mean after life time at age x
x	l_x	d_x	q_x	p_x	L_x	T_x	$e°_x$
1	2	3	4	5	6	7	8
50	47,005	1,609	·03422	·96578	46,201	758,522	16·14
51	45,396	1,618	·03565	·96435	44,587	712,321	15·69
52	43,778	1,624	·03710	·96290	42,966	667,734	15·25
53	42,154	1,619	·03840	·96160	41,345	624,768	14·82
54	40,535	1,608	·03967	·96033	39,731	583,423	14·39
55	38,927	1,583	·04067	·95933	38,135	543,692	13·97
56	37,344	1,582	·04236	·95764	36,553	505,557	13·54
57	35,762	1,581	·04422	·95578	34,972	469,004	13·11
58	34,181	1,580	·04622	·95378	33,391	434,032	12·70
59	32,601	1,575	·04830	·95170	31,813	400,641	12·29
60	31,026	1,567	·05050	·94950	30,243	368,828	11·89
61	29,459	1,554	·05276	·94724	28,682	338,585	11·49
62	27,905	1,538	·05513	·94487	27,136	309,903	11·11
63	26,367	1,520	·05763	·94237	25,607	282,767	10·72
64	24,847	1,496	·06021	·93979	24,099	257,160	10·35
65	23,351	1,469	·06291	·93709	22,617	233,061	9·98
66	21,882	1,438	·06569	·93431	21,163	210,444	9·62
67	20,444	1,404	·06863	·93137	19,742	189,281	9·26
68	19,040	1,366	·07170	·92830	18,356	169,539	8·90
69	17,674	1,324	·07488	·92512	17,012	151,183	8·55
70	16,350	1,280	·07826	·92174	15,710	134,171	8·21
71	15,070	1,232	·08173	·91827	14,454	118,461	7·86
72	13,838	1,182	·08536	·91464	13,247	104,007	7·52
73	12,656	1,138	·08988	·91012	12,087	90,760	7·17
74	11,518	1,092	·09480	·90520	10,972	78,673	6·83
75	10,426	1,042	·09990	·90010	9,905	67,701	6·49
76	9,384	988	·10520	·89480	8,890	57,796	6·16
77	8,396	929	·11060	·88940	7,931	48,906	5·82
78	7,467	869	·11640	·88360	7,033	40,975	5·49
79	6,598	807	·12220	·87780	6,194	33,942	5·14
80	5,791	744	·12840	·87160	5,419	27,748	4·79
81	5,047	693	·13720	·86280	4,701	22,329	4·42
82	4,354	669	·15344	·84656	4,019	17,628	4·05
83	3,685	638	·17293	·82707	3,366	13,609	3·69
84	3,047	593	·19462	·80538	2,751	10,243	3·36
85	2,454	537	·21866	·78134	2,185	7,492	3·05
86	1,917	470	·24519	·75481	1,682	5,307	2·77
87	1,447	397	·27433	·72567	1,249	3,625	2·51
88	1,050	322	·30617	·69383	889	2,376	2·26
89	728	248	·34078	·65922	604	1,487	2·04
90	480	182	·37813	·62187	389	883	1·84
91	298	125	·41814	·58186	236	494	1·66
92	173	80	·46061	·53939	133	258	1·49
93	93	47	·50527	·49473	70	125	1·34
94	46	26	·55168	·44832	33	55	1·20
95	20	12	·59930	·40070	14	22	1·10
96	8	5	·64745	·35255	6	8	1·00
97	3	2	·69532	·30468	2	2	0·66
98	1	1	·74202	·25798	...	...	...

EAST INDIA ZONE—MALES

Life Table (1941-50)

Age	Living at age x	Dying between ages x and x+1	Mortality rate	Survivance rate	Living between ages x and x+1	Living above age x	Mean after life time at age x
x	l_x	d_x	q_x	p_x	L_x	T_x	$\mathring{e}_x$
1	2	3	4	5	6	7	8
0	*155,620*	*35,011*	*·22500*	*·77500*	*130,315*	*1,380,323*	*28·1*
1	*120,608*	*9,183*	*·07614*	*·92386*	*115,741*	*1,250,008*	*35·2*
2	*111,427*	*5,219*	*·04684*	*·95316*	*108,807*	*1,134,267*	*37·1*
3	*106,204*	*3,450*	*·03286*	*·96714*	*104,560*	*1,025,160*	*37·9*
4	*102,714*	*2,714*	*·02642*	*·97358*	*101,502*	*3,920,900*	*38·1*
5	100,000	2,338	·02338	·97662	98,831	3,819,398	38·19
6	97,662	2,187	·02239	·97761	96,568	3,720,567	38·10
7	95,475	2,030	·02126	·97874	94,460	3,623,999	37·96
8	93,445	1,881	·02013	·97987	92,505	3,529,539	37·77
9	91,564	1,742	·01903	·98097	90,693	3,437,034	37·54
10	89,822	1,613	·01796	·98204	89,015	3,346,341	37·26
11	88,209	1,492	·01692	·98308	87,463	3,257,326	36·93
12	86,717	1,381	·01592	·98408	86,027	3,169,863	36·55
13	85,336	1,280	·01500	·98500	84,696	3,083,836	36·14
14	84,056	1,189	·01414	·98586	83,461	2,999,140	35·68
15	82,867	1,108	·01337	·98663	82,313	2,915,679	35·19
16	81,759	1,035	·01266	·98734	81,241	2,833,366	34·66
17	80,724	974	·01206	·98794	80,237	2,752,125	34·09
18	79,750	929	·01165	·98835	79,286	2,671,888	33·50
19	78,821	902	·01144	·98856	78,370	2,592,602	32·89
20	77,919	888	·01140	·98860	77,475	2,514,232	32·27
21	77,031	879	·01141	·98859	76,591	2,436,757	31·63
22	76,152	874	·01148	·98852	75,715	2,360,166	30·99
23	75,278	876	·01164	·98836	74,840	2,284,451	30·35
24	74,402	884	·01188	·98812	73,960	2,209,611	29·70
25	73,518	896	·01219	·98781	73,070	2,135,651	29·05
26	72,622	913	·01257	·98743	72,165	2,062,581	28·40
27	71,709	934	·01303	·98697	71,242	1,990,416	27·76
28	70,775	954	·01348	·98652	70,298	1,919,174	27·12
29	69,821	971	·01391	·98609	69,336	1,848,876	26·48
30	68,850	991	·01440	·98560	68,354	1,779,540	25·85
31	67,859	1,014	·01495	·98505	67,352	1,711,186	25·22
32	66,845	1,039	·01554	·98446	66,325	1,643,834	24·59
33	65,806	1,067	·01622	·98378	65,273	1,577,509	23·97
34	64,739	1,100	·01699	·98301	64,189	1,512,236	23·36
35	63,639	1,134	·01782	·98218	63,072	1,448,047	22·75
36	62,505	1,169	·01870	·98130	61,920	1,384,975	22·16
37	61,336	1,204	·01963	·98037	60,734	1,323,055	21·57
38	60,132	1,239	·02061	·97939	59,512	1,262,321	20·99
39	58,893	1,275	·02165	·97835	58,256	1,202,809	20·42
40	57,618	1,309	·02272	·97728	56,964	1,144,553	19·86
41	56,309	1,342	·02383	·97617	55,638	1,087,589	19·31
42	54,967	1,374	·02499	·97501	54,280	1,031,951	18·77
43	53,593	1,406	·02623	·97377	52,890	977,671	18·24
44	52,187	1,437	·02754	·97246	51,468	924,781	17·72
45	50,750	1,466	·02889	·97111	50,017	873,313	17·21
46	49,284	1,493	·03029	·96971	48,538	823,296	16·71
47	47,791	1,516	·03172	·96828	47,033	774,758	16·21
48	46,275	1,530	·03307	·96693	45,510	727,725	15·73
49	44,745	1,538	·03438	·96562	43,976	682,215	15·25

EAST INDIA ZONE—MALES

Life Table (1941-50)—contd.

Age	Living at age x	Dying between ages x and x+1	Mortality rate	Survivance rate	Living between ages x and x+1	Living above age x	Mean after life time at age x
x	l_x	d_x	q_x	p_x	L_x	T_x	e^o_x
1	2	3	4	5	6	7	8
50	43,207	1,545	·03575	·96425	42,434	638,239	14·77
51	41,662	1,552	·03726	·96274	40,886	595,805	14·30
52	40,110	1,557	·03883	·96117	39,331	554,919	13·83
53	38,553	1,563	·04053	·95947	37,771	515,588	13·37
54	36,990	1,565	·04231	·95769	36,207	477,817	12·92
55	35,425	1,567	·04423	·95577	34,642	441,610	12·47
56	33,858	1,569	·04634	·95366	33,074	406,968	12·02
57	32,289	1,571	·04865	·95135	31,503	373,894	11·58
58	30,718	1,579	·05140	·94860	29,929	342,391	11·15
59	29,139	1,582	·05429	·94571	28,348	312,462	10·72
60	27,557	1,588	·05763	·94237	26,763	284,114	10·31
61	25,969	1,584	·06100	·93900	25,177	257,351	9·91
62	24,385	1,573	·06451	·93549	23,599	232,174	9·52
63	22,812	1,557	·06825	·93175	22,033	208,575	9·14
64	21,255	1,535	·07222	·92778	20,487	186,542	8·78
65	19,720	1,506	·07636	·92364	18,967	166,055	8·42
66	18,214	1,471	·08076	·91924	17,479	147,088	8·08
67	16,743	1,430	·08538	·91462	16,028	129,609	7·74
68	15,313	1,382	·09028	·90972	14,622	113,581	7·42
69	13,931	1,330	·09544	·90456	13,266	98,959	7·10
70	12,601	1,271	·10086	·89914	11,966	85,693	6·80
71	11,330	1,207	·10656	·89344	10,726	73,727	6·51
72	10,123	1,140	·11260	·88740	9,553	63,001	6·22
73	8,983	1,068	·11894	·88106	8,449	53,448	5·95
74	7,915	994	·12560	·87440	7,418	44,999	5·69
75	6,921	918	·13262	·86738	6,462	37,581	5·43
76	6,003	840	·14000	·86000	5,583	31,119	5·18
77	5,163	763	·14774	·85226	4,781	25,536	4·95
78	4,400	686	·15588	·84412	4,057	20,755	4·72
79	3,714	611	·16444	·83556	3,409	16,698	4·50
80	3,103	538	·17340	·82660	2,834	13,289	4·28
81	2,565	469	·18278	·81722	2,330	10,455	4·08
82	2,096	404	·19261	·80739	1,894	8,125	3·88
83	1,692	343	·20293	·79707	1,520	6,231	3·68
84	1,349	288	·21370	·78630	1,205	4,711	3·49
85	1,061	239	·22495	·77505	941	3,506	3·30
86	822	195	·23670	·76330	725	2,565	3·12
87	627	157	·25009	·74991	549	1,840	2·94
88	470	127	·26983	·73017	407	1,291	2·75
89	343	96	·27954	·72046	295	884	2·58
90	247	73	·29600	·70400	210	589	2·38
91	174	57	·32650	·67350	145	379	2·18
92	117	41	·34884	·65116	97	234	2·00
93	76	29	·37500	·62500	61	137	1·80
94	47	20	·42000	·58000	37	76	1·61
95	27	12	·43576	·56424	21	39	1·44
96	15	8	·47676	·52324	11	18	1·20
97	7	4	·50792	·49208	5	7	1·00
98	3	2	·58475	·41525	2	2	0·66
99	1	1	·62720	·37280	...	...	...

EAST INDIA ZONE—FEMALES

Life Table (1941-50)

Age	Living at age x	Dying between ages x and x+1	Mortality rate	Survivance rate	Living between ages x and x+1	Living above age x	Mean after life time at age x
x	l_x	d_x	q_x	p_x	$L_{x,1}$	T_x	e°_x
1	2	3	4	5	6	7	8
0	*154,371*	*30,874*	*·20000*	*·80000*	*133,328*	*4,231,111*	*27·41*
1	*123,497*	*10,323*	*·08359*	*·91641*	*117,974*	*4,097,783*	*33·18*
2	*113,174*	*6,033*	*·05331*	*·94669*	*110,066*	*3,979,809*	*35·17*
3	*107,141*	*4,040*	*·03771*	*·96229*	*105,148*	*3,869,743*	*36·12*
4	*103,101*	*3,101*	*·03008*	*·96992*	*101,632*	*3,764,595*	*36·51*
5	100,000	2,636	·02636	·97364	98,682	3,662,963	36·63
6	97,364	2,429	·02495	·97505	96,150	3,564,281	36·61
7	94,935	2,231	·02350	·97650	93,819	3,468,131	36·53
8	92,704	2,043	·02204	·97796	91,683	3,374,311	36·40
9	90,661	1,868	·02060	·97940	89,727	3,282,629	36·21
10	88,793	1,700	·01915	·98085	87,943	3,192,902	35·96
11	87,093	1,543	·01772	·98228	86,321	3,104,959	35·65
12	85,550	1,399	·01635	·98365	84,851	3,018,638	35·29
13	84,151	1,269	·01508	·98492	83,516	2,933,787	34·86
14	82,882	1,151	·01389	·98611	82,306	2,850,271	34·39
15	81,731	1,046	·01280	·98720	81,208	2,767,965	33·87
16	80,685	954	·01182	·98818	80,208	2,686,757	33·30
17	79,731	878	·01101	·98899	79,292	2,606,549	32·69
18	78,853	829	·01051	·98949	78,439	2,527,257	32·05
19	78,024	804	·01030	·98970	77,622	2,448,818	31·39
20	77,220	792	·01026	·98974	76,824	2,371,196	30·71
21	76,428	792	·01036	·98964	76,032	2,294,372	30·02
22	75,636	806	·01065	·98935	75,233	2,218,340	29·33
23	74,830	834	·01115	·98885	74,413	2,143,107	28·64
24	73,996	878	·01187	·98813	73,557	2,068,694	27·96
25	73,118	931	·01273	·98727	72,653	1,995,137	27·29
26	72,187	989	·01370	·98630	71,692	1,922,484	26·64
27	71,198	1,049	·01474	·98526	70,673	1,850,792	25·99
28	70,149	1,112	·01585	·98415	69,593	1,780,119	25·38
29	69,037	1,175	·01702	·98298	68,449	1,710,526	24·78
30	67,862	1,238	·01824	·98176	67,243	1,642,077	24·20
31	66,624	1,299	·01950	·98050	65,975	1,574,834	23·64
32	65,325	1,356	·02076	·97924	64,647	1,508,859	23·09
33	63,969	1,405	·02197	·97803	63,266	1,444,212	22·58
34	62,564	1,449	·02316	·97684	61,840	1,380,946	22·07
35	61,115	1,486	·02431	·97569	60,372	1,319,106	21·58
36	59,629	1,519	·02547	·97453	58,870	1,258,734	21·11
37	58,110	1,545	·02659	·97341	57,337	1,199,864	20·65
38	56,565	1,561	·02759	·97241	55,784	1,142,527	20·20
39	55,004	1,568	·02850	·97150	54,220	1,086,743	19·76
40	53,436	1,569	·02937	·97063	52,652	1,032,523	19·32
41	51,867	1,568	·03023	·96977	51,083	979,871	18·89
42	50,299	1,561	·03104	·96896	49,518	928,788	18·47
43	48,738	1,545	·03170	·96830	47,966	879,270	18·04
44	47,193	1,521	·03223	·96777	46,432	831,304	17·62
45	45,672	1,496	·03276	·96724	44,924	784,872	17·19
46	44,176	1,472	·03331	·96669	43,440	739,948	16·75
47	42,704	1,446	·03386	·96614	41,981	696,508	16·31
48	41,258	1,419	·03439	·96561	40,549	654,527	15·86
49	39,839	1,391	·03492	·96508	39,143	613,978	15·41

EAST INDIA ZONE—FEMALES

Life Table (1941-50)—contd.

Age	Living at age x	Dying between ages x and x+1	Mortality rate	Survivance rate	Living between ages x and x+1	Living above age x	Mean after life time at age x
x	x	d_x	q_x	p_x	L_x	T_x	$e°_x$
1	2	3	4	5	6	7	8
50	38,448	1,379	·03586	·96414	37,758	574,835	14·95
51	37,069	1,365	·03681	·96319	36,387	537,077	14·49
52	35,704	1,352	·03785	·96215	35,028	500,690	14·02
53	34,352	1,340	·03900	·96100	33,682	465,662	13·56
54	33,012	1,330	·04029	·95971	32,347	431,980	13·09
55	31,682	1,322	·04170	·95830	31,021	399,633	12·61
56	30,360	1,324	·04358	·95642	29,698	368,612	12·14
57	29,036	1,340	·04613	·95387	28,366	338,914	11·67
58	27,696	1,359	·04906	·95094	27,017	310,548	11·21
59	26,337	1,375	·05218	·94782	25,649	283,531	10·77
60	24,962	1,385	·05546	·94454	24,270	257,882	10·33
61	23,577	1,391	·05896	·94104	22,881	233,612	9·91
62	22,186	1,391	·06268	·93732	21,491	210,731	9·50
63	20,795	1,385	·06658	·93342	20,102	189,240	9·10
64	19,410	1,374	·07078	·92922	18,723	169,138	8·71
65	18,036	1,357	·07520	·92480	17,357	150,415	8·34
66	16,679	1,333	·07990	·92010	16,013	133,058	7·98
67	15,346	1,303	·08486	·91514	14,694	117,045	7·63
68	14,043	1,266	·09010	·90990	13,410	102,351	7·29
69	12,777	1,223	·09568	·90432	12,165	88,941	6·96
70	11,554	1,174	·10158	·89842	10,967	76,776	6·65
71	10,380	1,119	·10780	·89220	9,821	65,809	6·34
72	9,261	1,060	·11446	·88554	8,731	55,988	6·05
73	8,201	996	·12136	·87864	7,703	47,257	5·76
74	7,205	928	·12872	·87128	6,741	39,554	5·49
75	6,277	857	·13649	·86351	5,848	32,813	5·23
76	5,420	785	·14469	·85531	5,028	26,965	4·98
77	4,635	711	·15333	·84667	4,279	21,937	4·73
78	3,924	638	·16244	·83756	3,605	17,658	4·50
79	3,286	566	·17204	·82796	3,003	14,053	4·28
80	2,720	496	·18215	·81785	2,472	11,050	4·06
81	2,224	429	·19277	·80723	2,010	8,578	3·86
82	1,795	367	·20393	·79607	1,611	6,568	3·66
83	1,428	308	·21567	·78433	1,274	4,957	3·47
84	1,120	256	·22795	·77205	992	3,683	3·29
85	864	209	·24082	·75918	759	2,691	3·12
86	655	167	·25430	·74570	572	1,932	2·95
87	488	131	·26837	·73163	422	1,360	2·78
88	357	102	·28309	·71691	306	938	2·63
89	255	77	·29842	·70158	217	632	2·48
90	178	56	·31439	·68561	150	415	2·34
91	122	41	·33103	·66897	101	265	2·18
92	81	29	·34827	·65173	67	164	2·02
93	52	20	·36616	·63384	42	97	1·87
94	32	13	·38467	·61533	25	55	1·72
95	19	8	·40380	·59620	15	30	1·58
96	11	5	·42350	·57650	9	15	1·36
97	6	3	·44378	·55622	4	6	1·00
98	3	2	·46459	·53541	2	2	0·66
99	1	1	·48590	·51410	...	...	...

SOUTH INDIA ZONE—MALES

Life Table—(1941-50)

Age	Living at age x	Dying between ages x and x+1	Mortality rate	Survivance rate	Living between ages x and x+1	Living above age x	Mean after life time at age x
x	l_x	d_x	q_x	p_x	L_x	T_x	$\overset{o}{e}_x$
1	2	3	4	5	6	7	8
0	*137,094*	*23,306*	*·17000*	*·83000*	*120,424*	*4,965,960*	*36·22*
1	*113,788*	*6,311*	*·05546*	*·94451*	*110,417*	*4,845,536*	*42·58*
2	*107,477*	*3,497*	*·03251*	*·96746*	*105,705*	*4,735,119*	*44·06*
3	*103,980*	*2,267*	*·02180*	*·97820*	*102,902*	*4,629,414*	*44·52*
4	*101,713*	*1,713*	*·01684*	*·98316*	*100,947*	*4,526,512*	*44·50*
5	100,000	1,446	·01446	·98554	99,277	4,425,565	44·26
6	98,554	1,338	·01358	·98642	97,885	4,326,288	43·90
7	97,216	1,239	·01274	·98726	96,596	4,228,403	43·49
8	95,977	1,147	·01195	·98805	95,404	4,131,807	43·05
9	94,830	1,062	·01120	·98880	94,299	4,036,403	42·56
10	93,768	986	·01051	·98949	93,275	3,942,104	42·04
11	92,782	920	·00992	·99008	92,322	3,848,829	41·48
12	91,862	864	·00940	·99060	91,430	3,756,507	40·89
13	90,998	814	·00894	·99106	90,591	3,665,077	40·28
14	90,184	774	·00858	·99142	89,797	3,574,486	39·64
15	89,410	742	·00830	·99170	89,039	3,484,689	38·97
16	88,668	716	·00807	·99193	88,310	3,395,650	38·30
17	87,952	703	·00799	·99201	87,600	3,307,340	37·60
18	87,249	711	·00815	·99185	86,893	3,219,740	36·90
19	86,538	738	·00853	·99147	86,169	3,132,847	36·20
20	85,800	773	·00901	·99099	85,414	3,046,678	35·51
21	85,027	810	·00953	·99047	84,622	2,961,264	34·83
22	84,217	849	·01008	·98992	83,792	2,876,642	34·16
23	83,368	880	·01055	·98945	82,928	2,792,850	33·50
24	82,488	903	·01095	·98905	82,037	2,709,922	32·85
25	81,585	926	·01135	·98865	81,122	2,627,885	32·21
26	80,659	949	·01177	·98823	80,184	2,546,763	31·57
27	79,710	971	·01218	·98782	79,225	2,466,579	30·94
28	78,739	984	·01250	·98750	78,247	2,387,354	30·32
29	77,755	991	·01274	·98726	77,259	2,309,107	29·70
30	76,764	996	·01298	·98702	76,266	2,231,848	29·07
31	75,768	1,002	·01322	·98678	75,267	2,155,582	28·45
32	74,766	1,007	·01347	·98653	74,263	2,080,315	27·82
33	73,759	1,013	·01373	·98627	73,253	2,006,052	27·20
34	72,746	1,021	·01403	·98597	72,235	1,932,799	26·57
35	71,725	1,029	·01434	·98566	71,210	1,860,564	25·94
36	70,696	1,036	·01466	·98534	70,178	1,789,354	25·31
37	69,660	1,046	·01501	·98499	69,137	1,719,176	24·68
38	68,614	1,055	·01538	·98462	68,087	1,650,039	24·05
39	67,559	1,064	·01575	·98425	67,027	1,581,952	23·42
40	66,495	1,076	·01618	·98382	65,957	1,514,925	22·78
41	65,419	1,091	·01668	·98332	64,873	1,448,968	22·15
42	64,328	1,108	·01723	·98277	63,774	1,384,095	21·52
43	63,220	1,127	·01783	·98217	62,657	1,320,321	20·88
44	62,093	1,147	·01848	·98152	61,519	1,257,664	20·25
45	60,946	1,168	·01917	·98083	60,362	1,196,145	19·63
46	59,778	1,196	·02001	·97999	59,180	1,135,783	19·00
47	58,582	1,230	·02099	·97901	57,967	1,076,603	18·38
48	57,352	1,262	·02201	·97799	56,721	1,018,636	17·77
49	56,090	1,297	·02312	·97688	55,442	961,915	17·15

SOUTH INDIA ZONE—MALES

Life Table—(1941-50)—contd.

Age	Living at age x	Dying between ages x and x+1	Mortality rate	Survivance rate	Living between ages x and x+1	Living above age x	Mean after life time at age x
x	l_x	d_x	q_x	p_x	L_x	T_x	$\overset{o}{e}_x$
1	2	3	4	5	6	7	8
50	54,793	1,335	·02436	·97564	54,125	906,473	16·54
51	53,458	1,377	·02575	·97425	52,769	852,348	15·94
52	52,081	1,421	·02728	·97272	51,371	799,579	15·35
53	50,660	1,468	·02897	·97103	49,926	748,208	14·77
54	49,192	1,518	·03085	·96915	48,433	698,282	14·20
55	47,674	1,568	·03289	·96711	46,890	649,849	13·63
56	46,106	1,628	·03530	·96470	45,292	602,959	13·08
57	44,478	1,686	·03790	·96210	43,635	557,667	12·54
58	42,792	1,741	·04069	·95931	41,922	514,032	12·01
59	41,051	1,793	·04367	·95633	40,155	472,110	11·50
60	39,258	1,841	·04688	·95312	38,338	431,955	11·00
61	37,417	1,882	·05030	·94970	36,476	393,617	10·52
62	35,535	1,918	·05396	·94604	34,576	357,141	10·05
63	33,617	1,947	·05790	·94210	32,643	322,565	9·60
64	31,670	1,967	·06210	·93790	30,687	289,922	9·15
65	29,703	1,978	·06658	·93342	28,714	259,235	8·73
66	27,725	1,981	·07144	·92856	26,735	230,521	8·31
67	25,744	1,972	·07658	·92342	24,758	203,786	7·92
68	23,772	1,952	·08210	·91790	22,796	179,028	7·53
69	21,820	1,919	·08796	·91204	20,860	156,232	7·16
70	19,901	1,876	·09426	·90574	18,963	135,372	6·80
71	18,025	1,820	·10096	·89904	17,115	116,409	6·46
72	16,205	1,753	·10812	·89188	15,329	99,294	6·13
73	14,452	1,673	·11574	·88426	13,615	83,965	5·81
74	12,779	1,583	·12386	·87614	11,987	70,350	5·51
75	11,196	1,484	·13252	·86748	10,454	58,363	5·21
76	9,712	1,377	·14172	·85828	9,023	47,909	4·93
77	8,335	1,263	·15151	·84849	7,703	38,886	4·67
78	7,072	1,145	·16188	·83812	6,500	31,183	4·41
79	5,927	1,026	·17295	·82705	5,414	24,683	4·16
80	4,901	905	·18465	·81535	4,449	19,269	3·93
81	3,996	788	·19701	·80299	3,602	14,820	3·71
82	3,208	675	·21015	·78985	2,870	11,218	3·50
83	2,533	568	·22400	·77600	2,249	8,348	3·30
84	1,965	469	·23863	·76137	1,730	6,099	3·10
85	1,496	381	·25407	·74593	1,306	4,369	2·92
86	1,115	302	·27030	·72970	964	3,063	2·75
87	813	234	·28735	·71265	696	2,099	2·58
88	579	177	·30524	·69476	490	1,403	2·42
89	402	131	·32397	·67603	336	913	2·27
90	271	94	·34353	·65647	224	577	2·13
91	177	65	·36396	·63604	145	353	1·99
92	112	44	·38519	·61481	90	208	1·86
93	68	28	·40723	·59277	54	118	1·74
94	40	18	·43006	·56994	31	64	1·60
95	22	10	·45360	·54640	17	33	1·50
96	12	6	·47783	·52217	9	16	1·33
97	6	3	·50287	·49713	5	7	1·17
98	3	2	·52808	·47192	2	2	0·66
99	1	1	·55395	·44605	...	...	...

SOUTH INDIA ZONE—FEMALES

Life Table—(1941-50)

Age	Living at age x	Dying between ages x and x+1	Mortality rate	Survivance rate	Living between ages x and x+1	Living above age x	Mean after life time at age x
x	l_x	d_x	q_x	p_x	L_x	T_x	e^o_x
1	2	3	4	5	6	7	8
0	*136,742*	*21,196*	*·15500*	*·84500*	*122,416*	*5,091,859*	*37·23*
1	*115,546*	*7,138*	*·06178*	*·93822*	*111,694*	*4,969,443*	*43·00*
2	*108,408*	*4,005*	*·03694*	*·96306*	*106,320*	*4,857,749*	*44·81*
3	*104,403*	*2,545*	*·02438*	*·97562*	*103,134*	*4,751,429*	*45·51*
4	*101,858*	*1,858*	*·01824*	*·98176*	*100,973*	*4,648,295*	*45·64*
5	100,000	1,517	·01517	·98483	99,242	4,547,322	45·47
6	98,483	1,365	·01386	·98614	97,800	4,448,080	45·17
7	97,118	1,226	·01262	·98738	96,505	4,350,280	44·79
8	95,892	1,098	·01145	·98855	95,343	4,253,775	44·36
9	94,794	980	·01034	·98966	94,304	4,158,432	43·87
10	93,814	875	·00933	·99067	93,377	4,064,128	43·32
11	92,939	783	·00842	·99158	92,548	3,970,751	42·72
12	92,156	701	·00761	·99239	91,805	3,878,203	42·08
13	91,455	633	·00692	·99308	91,139	3,786,398	41·40
14	90,822	575	·00633	·99367	90,534	3,695,259	40·69
15	90,247	529	·00586	·99414	89,983	3,604,725	39·94
16	89,718	495	·00552	·99448	89,470	3,514,742	39·18
17	89,223	473	·00530	·99470	88,987	3,425,272	38·39
18	88,750	474	·00534	·99466	88,513	3,336,285	37·59
19	88,276	510	·00578	·99422	88,021	3,247,772	36·79
20	87,766	555	·00632	·99368	87,488	3,159,751	36·00
21	87,211	604	·00693	·99307	86,909	3,072,263	35·23
22	86,607	658	·00760	·99240	86,278	2,985,354	34·47
23	85,949	713	·00830	·99170	85,593	2,899,076	33·73
24	85,236	767	·00900	·99100	84,852	2,813,483	33·01
25	84,469	823	·00974	·99026	84,058	2,728,631	32·30
26	83,646	879	·01051	·98949	83,206	2,644,573	31·62
27	82,767	934	·01129	·98871	82,300	2,561,367	30·95
28	81,833	982	·01200	·98800	81,342	2,479,067	30·29
29	80,851	1,021	·01263	·98737	80,341	2,397,725	29·66
30	79,830	1,056	·01323	·98677	79,302	2,317,384	29·03
31	78,774	1,091	·01385	·98615	78,229	2,238,082	28·41
32	77,683	1,120	·01442	·98558	77,123	2,159,853	27·80
33	76,563	1,146	·01497	·98503	75,990	2,082,730	27·20
34	75,417	1,169	·01550	·98450	74,832	2,006,740	26·61
35	74,248	1,188	·01600	·98400	73,654	1,931,908	26·02
36	73,060	1,205	·01649	·98351	72,457	1,858,254	25·43
37	71,855	1,220	·01698	·98302	71,245	1,785,797	24·85
38	70,635	1,235	·01748	·98252	70,017	1,714,552	24·27
39	69,400	1,248	·01798	·98202	68,776	,644,535	23·70
40	68,152	1,260	·01848	·98152	67,522	1,575,759	23·12
41	66,892	1,271	·01900	·98100	66,257	1,508,237	22·55
42	65,621	1,278	·01948	·98052	64,982	1,441,980	21·97
43	64,343	1,280	·01989	·98011	63,703	1,376,998	21·40
44	63,063	1,282	·02033	·97967	62,422	1,313,295	20·83
45	61,781	1,284	·02078	·97922	61,139	1,250,873	20·25
46	60,497	1,286	·02126	·97874	59,854	1,189,734	19·67
47	59,211	1,287	·02174	·97826	58,568	1,129,880	19·08
48	57,924	1,287	·02221	·97779	57,280	1,071,312	18·50
49	56,637	1,297	·02289	·97711	55,989	1,014,032	17·90

SOUTH INDIA ZONE—FEMALES

Life Table—(1941—50)—contd.

Age	Living at age x	Dying between ages x and x+1	Mortality rate	Survivance rate	Living between ages x and x+1	Living above age x	Mean after life time at age x
x	l_x	d_x	q_x	p_x	L_x	T_x	e^0_x
1	2	3	4	5	6	7	8
50	55,340	1,297	·02344	·97656	54,691	958,043	17·31
51	54,043	1,300	·02406	·97594	53,393	903,352	16·72
52	52,743	1,306	·02477	·97523	52,090	849,959	16·12
53	51,437	1,316	·02559	·97441	50,779	797,869	15·51
54	50,121	1,346	·02686	·97314	49,448	747,090	14·91
55	48,775	1,386	·02842	·97158	48,082	697,642	14·30
56	47,389	1,455	·03071	·96929	46,661	649,560	13·71
57	45,934	1,457	·03172	·96828	45,206	602,899	13·13
58	44,477	1,594	·03584	·96416	43,680	557,693	12·54
59	42,883	1,660	·03871	·96129	42,053	514,013	11·99
60	41,223	1,724	·04181	·95819	40,361	471,960	11·45
61	39,499	1,783	·04515	·95485	38,608	431,599	10·93
62	37,716	1,839	·04875	·95125	36,796	392,991	10·42
63	35,877	1,888	·05263	·94737	34,933	356,195	9·93
64	33,989	1,931	·05681	·94319	33,023	321,262	9·45
65	32,058	1,965	·06131	·93869	31,076	288,239	8·99
66	30,093	1,991	·06617	·93383	29,097	257,163	8·55
67	28,102	2,006	·07138	·92862	27,099	228,066	8·12
68	26,096	2,009	·07698	·92302	25,091	200,967	7·70
69	24,087	1,999	·08300	·91700	23,088	175,876	7·30
70	22,088	1,976	·08946	·91054	21,100	152,788	6·92
71	20,112	1,939	·09641	·90359	19,143	131,688	6·55
72	18,173	1,888	·10387	·89613	17,229	112,545	6·19
73	16,285	1,822	·11186	·88814	15,374	95,316	5·85
74	14,463	1,742	·12043	·87957	13,592	79,942	5·53
75	12,721	1,649	·12960	·87040	11,897	66,350	5·22
76	11,072	1,544	·13942	·86058	10,300	54,453	4·92
77	9,528	1,428	·14992	·85008	8,814	44,153	4·63
78	8,100	1,305	·16114	·83886	7,447	35,339	4·36
79	6,795	1,176	·17311	·82689	6,207	27,892	4·11
80	5,619	1,045	·18590	·81410	5,096	21,685	3·86
81	4,574	912	·19947	·80053	4,118	16,589	3·63
82	3,662	783	·21390	·78610	3,270	12,471	3·41
83	2,879	660	·22922	·77078	2,549	9,201	3·20
84	2,219	545	·24545	·75455	1,946	6,652	3·00
85	1,674	440	·26262	·73738	1,454	4,706	2·81
86	1,234	346	·28077	·71923	1,061	3,252	2·64
87	888	266	·29988	·70012	755	2,191	2·47
88	622	199	·32000	·68000	522	1,436	2·31
89	423	144	·34111	·65889	351	914	2·17
90	279	101	·36321	·63679	229	563	2·02
91	178	69	·38627	·61373	144	334	1·88
92	109	45	·41028	·58972	86	190	1·74
93	64	28	·43518	·56482	50	104	1·63
94	36	17	·46096	·53904	27	54	1·50
95	19	9	·48752	·51248	15	27	1·42
96	10	5	·51478	·48522	7	12	1·20
97	5	3	·54265	·45735	4	5	1·00
98	2	1	·57098	·42902	1	1	0·50
99	1	1	·59966	·40034	...	...	...

WEST INDIA ZONE—MALES

Life Table—(1941—50)

Age	Living at age x	Dying between ages x and x+1	Mortality rate	Survivance rate	Living between ages x and x+1	Living above age x	Mean after life time at age x
x	l_x	d_x	q_x	p_x	L_x	T_x	e°_x
1	2	3	4	5	6	7	8
0	*146,522*	*27,839*	*·19000*	*·81000*	*133,573*	*4,591,449*	*31·33*
1	*118,683*	*8,798*	*·07413*	*·92587*	*117,028*	*4,457,876*	*37·56*
2	*109,885*	*4,753*	*·04326*	*·95674*	*108,760*	*4,340,848*	*39·50*
3	*105,132*	*2,967*	*·02822*	*·97178*	*104,217*	*4,232,088*	*40·25*
4	*102,165*	*2,165*	*·02119*	*·97881*	*101,348*	*4,127,871*	*40·40*
5	100,000	1,786	·01786	·98214	99,107	4,026,523	40·27
6	98,214	1,627	·01657	·98343	97,400	3,927,416	39·99
7	96,587	1,481	·01533	·98467	95,847	3,830,016	39·65
8	95,106	1,348	·01417	·98583	94,432	3,734,169	39·27
9	93,758	1,227	·01309	·98691	93,144	3,639,737	38·82
10	92,531	1,121	·01212	·98788	91,970	3,546,593	38·33
11	91,410	1,027	·01123	·98877	90,897	3,454,623	37·79
12	90,383	944	·01044	·98956	89,911	3,363,726	37·22
13	89,439	873	·00976	·99024	89,002	3,273,815	36·60
14	88,566	813	·00918	·99082	88,159	3,184,813	35·96
15	87,753	763	·00870	·99130	87,371	3,096,654	35·29
16	86,990	723	·00831	·99169	86,628	3,009,283	34·59
17	86,267	694	·00804	·99196	85,920	2,922,655	33·88
18	85,573	676	·00790	·99210	85,235	2,836,735	33·15
19	84,897	677	·00797	·99203	84,559	2,751,500	32·41
20	84,220	685	·00813	·99187	83,878	2,666,941	31·67
21	83,535	701	·00839	·99161	83,185	2,583,063	30·92
22	82,834	723	·00873	·99127	82,472	2,499,878	30·18
23	82,111	750	·00914	·99086	81,736	2,417,406	29·44
24	81,361	782	·00961	·99039	80,970	2,335,670	28·71
25	80,579	819	·01016	·98984	80,169	2,254,700	27·98
26	79,760	860	·01078	·98922	79,330	2,174,531	27·26
27	78,900	907	·01150	·98850	78,447	2,095,201	26·56
28	77,993	961	·01232	·98768	77,513	2,016,754	25·86
29	77,032	1,021	·01325	·98675	76,522	1,939,241	25·17
30	76,011	1,083	·01425	·98575	75,470	1,862,719	24·51
31	74,928	1,146	·01529	·98471	74,355	1,787,249	23·85
32	73,782	1,208	·01637	·98363	73,178	1,712,894	23·22
33	72,574	1,271	·01752	·98248	71,939	1,639,716	22·59
34	71,303	1,337	·01875	·98125	70,634	1,567,777	21·99
35	69,966	1,401	·02002	·97998	69,266	1,497,143	21·40
36	68,565	1,464	·02135	·97865	67,833	1,427,877	20·83
37	67,101	1,516	·02259	·97741	66,343	1,360,044	20·27
38	65,585	1,550	·02363	·97637	64,810	1,293,701	19·73
39	64,035	1,566	·02446	·97554	63,252	1,228,891	19·19
40	62,469	1,577	·02524	·97476	61,681	1,165,639	18·66
41	60,892	1,589	·02610	·97390	60,097	1,103,958	18·13
42	59,303	1,601	·02700	·97300	58,503	1,043,861	17·61
43	57,702	1,609	·02789	·97211	56,897	985,358	17·08
44	56,093	1,615	·02880	·97120	55,285	928,461	16·55
45	54,478	1,622	·02977	·97023	53,667	873,176	16·03
46	52,856	1,630	·03084	·96916	52,041	819,509	15·50
47	51,226	1,643	·03207	·96793	50,405	767,468	14·98
48	49,583	1,663	·03353	·96647	48,752	717,063	14·46
49	47,920	1,690	·03527	·96473	47,075	668,311	13·95

WEST INDIA ZONE—MALES

Life Table—(1941—50)—contd.

Age	Living at age x	Dying between ages x and x+1	Mortality rate	Survivance rate	Living between ages x and x+1	Living above age x	Mean after life time at age x
x	l_x	d_x	q_x	p_x	L_x	T_x	e°_x
1	2	3	4	5	6	7	8
50	46,230	1,729	·03740	·96260	45,365	621,236	13·44
51	44,501	1,812	·04072	·95928	43,595	575,871	12·94
52	42,689	1,844	·04319	·95681	41,767	532,276	12·47
53	40,845	1,883	·04610	·95390	39,904	490,509	12·01
54	38,962	1,917	·04919	·95081	38,004	450,605	11·57
55	37,045	1,931	·05213	·94787	36,080	412,601	11·13
56	35,114	1,934	·05508	·94492	34,147	376,521	10·72
57	33,180	1,931	·05821	·94179	32,214	342,374	10·32
58	31,249	1,922	·06150	·93850	30,288	310,160	9·93
59	29,327	1,906	·06498	·93502	28,374	279,872	9·54
60	27,421	1,883	·06866	·93134	26,479	251,498	9·17
61	25,538	1,853	·07254	·92746	24,612	225,019	8·81
62	23,685	1,814	·07660	·92340	22,778	200,407	8·46
63	21,871	1,769	·08090	·91910	20,986	177,629	8·12
64	20,102	1,717	·08540	·91460	19,244	156,643	7·79
65	18,385	1,658	·09016	·90984	17,556	137,399	7·47
66	16,727	1,592	·09518	·90482	15,931	119,843	7·16
67	15,135	1,520	·10046	·89954	14,375	103,912	6·87
68	13,615	1,443	·10602	·89398	12,893	89,537	6·58
69	12,172	1,362	·11186	·88814	11,491	76,644	6·30
70	10,810	1,276	·11802	·88198	10,172	65,153	6·03
71	9,534	1,187	·12448	·87552	8,941	54,981	5·77
72	8,347	1,096	·13126	·86874	7,799	46,040	5·52
73	7,251	1,003	·13836	·86164	6,749	38,241	5·27
74	6,248	911	·14584	·85416	5,793	31,492	5·04
75	5,337	820	·15366	·84634	4,927	25,699	4·81
76	4,517	731	·16188	·83812	4,151	20,772	4·60
77	3,786	646	·17051	·82949	3,463	16,621	4·39
78	3,140	564	·17952	·82048	2,858	13,158	4·19
79	2,576	487	·18898	·81102	2,333	10,300	4·00
80	2,089	416	·19890	·80110	1,881	7,967	3·81
81	1,673	350	·20923	·79077	1,498	6,086	3·64
82	1,323	291	·22000	·78000	1,178	4,588	3·47
83	1,032	239	·23127	·76873	912	3,410	3·30
84	793	193	·24300	·75700	697	2,498	3·15
85	600	153	·25521	·74479	524	1,801	3·00
86	447	120	·26795	·73205	387	1,277	2·86
87	327	92	·28118	·71882	281	890	2·72
88	235	69	·29494	·70506	200	609	2·59
89	166	51	·30920	·69080	141	409	2·46
90	115	37	·32400	·67600	97	268	2·33
91	78	26	·33930	·66070	65	171	2·19
92	52	18	·35514	·64486	43	106	2·04
93	34	13	·37149	·62851	27	63	1·85
94	21	8	·38832	·61168	17	36	1·71
95	13	6	·40567	·59433	10	19	1·46
96	7	3	·42349	·57651	5	9	1·29
97	4	2	·44176	·55824	3	4	1·00
98	2	1	·46049	·53951	1	1	0·50
99	1	1	·47960	·52040	...	...	...

WEST INDIA ZONE—FEMALES

Life Table—(1941—50)

Age	Living at age x	Dying between ages x and x+1	Mortality rate	Survivance rate	Living between ages x and x+1	Living above age x	Mean after life time at age x
x	l_x	d_x	q_x	p_x	L_x	T_x	e°_x
1	2	3	4	5	6	7	8
0	*147,001*	*26,460*	*·18000*	*·82000*	*129,596*	*4,547,292*	*30·93*
1	*120,541*	*9,572*	*·07941*	*·92059*	*115,350*	*4,417,696*	*36·65*
2	*110,969*	*5,300*	*·04776*	*·95224*	*108,182*	*4,302,346*	*38·77*
3	*105,669*	*3,306*	*03129*	*·96871*	*104,000*	*4,194,164*	*39·69*
4	*102,363*	*2,363*	*·02308*	*·97692*	*101,221*	*4,090,164*	*39·96*
5	100,000	1,902	·01902	·98098	99,049	3,988,943	39·89
6	98,098	1,693	·01726	·98274	97,252	3,889,894	39·65
7	96,405	1,507	·01563	·98437	95,651	3,792,642	39·34
8	94,898	1,341	·01413	·98587	94,228	3,696,991	38·96
9	93,557	1,194	·01276	·98724	92,960	3,602,763	38·51
10	92,363	1,068	·01156	·98844	91,829	3,509,803	38·00
11	91,295	959	·01050	·98950	90,815	3,417,974	37·44
12	90,336	867	.00960	·99040	89,903	3,327,159	36·83
13	89,469	793	·00886	·99114	89,072	3,237,256	36·18
14	88,676	733	·00827	·99173	88,310	3,148,184	35·50
15	87,943	685	·00779	·99221	87,600	3,059,874	34·79
16	87,258	653	·00748	·99252	86,932	2,972,274	34·06
17	86,605	643	.00742	·99258	86,283	2,885,342	33·32
18	85,962	646	·00752	·99248	85,639	2,799,059	32·56
19	85,316	670	·00785	.99215	84,981	2,713,420	31·80
20	84,646	708	·00837	·99163	84,292	2,628,439	31·05
21	83,938	758	·00903	·99097	83,559	2,544,147	30·31
22	83,180	816	·00981	·99019	82,772	2,460,588	29·58
23	82,364	880	·01069	·98931	81,924	2,377,816	28·87
24	81,484	950	·01166	·98834	81,009	2,295,892	28·18
25	80,534	1,024	·01272	·98728	80,022	2,214,883	27·50
26	79,510	1,101	·01385	·98615	78,960	2,134,861	26·85
27	78,409	1,178	·01503	·98497	77,820	2,055,901	26·22
28	77,231	1,255	·01625	·98375	76,603	1,978,081	25·61
29	75,976	1,329	·01749	·98251	75,312	1,901,478	25·03
30	74,647	1,400	·01875	·98125	73,947	1,826,166	24·46
31	73,247	1,465	·02000	·98000	72,514	1,752,219	23·92
32	71,782	1,522	·02120	·97880	71,021	1,679,705	23·40
33	70,260	1,556	·02214	·97786	69,482	1,608,684	22·90
34	68,704	1,569	·02284	·97716	67,920	1,539,202	22·40
35	67,135	1,574	·02345	·97655	66,348	1,471,282	21·92
36	65,561	1,576	·02404	·97596	64,773	1,404,934	21·43
37	63,985	1,577	·02465	·97535	63,196	1,340,161	20·94
38	62,408	1,580	·02531	·97469	61,618	1,276,965	20·46
39	60,828	1,585	·02605	·97395	60,036	1,215,347	19·98
40	59,243	1,589	·02682	·97318	58,448	1,155,311	19·50
41	57,654	1,592	·02761	·97239	56,858	1,096,863	19·02
42	56,062	1,592	·02839	·97161	55,266	1,040,005	18·55
43	54,470	1,587	·02913	·97087	53,677	984,739	18·08
44	52,883	1,584	·02996	·97004	52,091	931,062	17·61
45	51,299	1,583	·03085	·96915	50,507	878,971	17·13
46	49,716	1,580	·03179	·96821	48,926	828,464	16·66
47	48,136	1,579	·03280	·96720	47,347	779,538	16·19
48	46,557	1,577	·03387	·96613	45,768	732,191	15·73
49	44,980	1,575	·03501	·96499	44,193	686,423	15·26

WEST INDIA ZONE—FEMALES

Life Table—(1941—50)—contd.

Age	Living at age x	Dying between ages x and x+1	Mortality rate	Survivane rate	Living between ages x and x+1	Living above age x	Mean after life time at age x
x	l_x	d_x	q_x	p_x	L_x	T_x	e_x°
1	2	3	4	5	6	7	8
50	43,405	1,573	·03624	·96376	42,618	642,230	14·80
51	41,832	1,571	·03755	·96245	41,047	599,612	14·33
52	40,261	1,569	·03897	·96103	39,476	558,565	13·87
53	38,692	1,564	·04041	·95959	37,910	519,089	13·42
54	37,128	1,557	·04194	·95806	36,350	481,179	12·96
55	35,571	1,550	·04358	·95642	34,796	444,829	12·51
56	34,021	1,544	·04538	·95462	33,249	410,033	12·05
57	32,477	1,541	·04745	·95255	31,706	376,784	11·60
58	30,936	1,548	·05004	·94996	30,162	345,078	11·15
59	29,388	1,568	·05335	·94665	28,604	314,916	10·72
60	27,820	1,575	·05661	·94339	27,033	286,312	10·29
61	26,245	1,576	·06006	·93994	25,457	259,279	9·88
62	24,669	1,572	·06371	·93629	23,883	233,82[illegible]	9·48
63	23,097	1,561	·06758	·93242	22,316	209,939	9·09
64	21,536	1,544	·07168	·92832	20,764	187,623	8·71
65	19,992	1,519	·07600	·92400	19,233	166,859	8·35
66	18,473	1,489	·08060	·91940	17,728	147,616	7·99
67	16,984	1,451	·08545	·91455	16,259	129,898	7·65
68	15,533	1,406	·09051	·90949	14,830	113,639	7·31
69	14,127	1,356	·09600	·90400	13,449	98,809	6·99
70	12,771	1,300	·10181	·89819	12,121	85,360	6·68
71	11,471	1,237	·10786	·89214	10,853	73,239	6·38
72	10,234	1,169	·11426	·88574	9,649	62,386	6·10
73	9,065	1,097	·12100	·87900	8,516	52,737	5·82
74	7,968	1,021	·12812	·87188	7,458	44,221	5·55
75	6,947	942	·13560	·86440	6,476	36,763	5·29
76	6,005	862	·14350	·85650	5,574	30,287	5·04
77	5,143	781	·15182	·84818	4,752	24,713	4·81
78	4,362	700	·16056	·83944	4,012	19,961	4·58
79	3,662	622	·16976	·83024	3,351	15,949	4·36
80	3,040	545	·17944	·82056	2,768	12,598	4·14
81	2,495	473	·18960	·81040	2,258	9,830	3·94
82	2,022	405	·20026	·79974	1,820	7,572	3·74
83	1,617	342	·21144	·78856	1,446	5,752	3·56
84	1,275	285	·22315	·77685	1,132	4,306	3·38
85	990	233	·23540	·76460	874	3,174	3·21
86	757	188	·24822	·75178	663	2,300	3·04
87	569	149	·26163	·73837	494	1,637	2·88
88	420	116	·27560	·72440	362	1,143	2·72
89	304	89	·29017	·70983	260	781	2·57
90	215	66	·30534	·69466	182	521	2·42
91	149	48	·32111	·67889	125	339	2·28
92	101	35	·33749	·66251	83	214	2·12
93	66	24	·35444	·64556	54	131	1·98
94	42	16	·37199	·62801	34	77	1·83
95	26	11	·39013	·60987	21	43	1·65
96	15	7	·40883	·59117	12	22	1·47
97	8	4	·42809	·57191	6	10	1·25
98	4	2	·44788	·55212	3	4	1·00
99	2	1	·46814	·53186	1	1	0·50
100	1	1	·48888	·51112	...	...	..

CENTRAL INDIA ZONE—MALES

Life Table—(1941-50)

Age	Living at age x	Dying between ages x and x+1	Mortality rate	Survivance rate	Living between ages x and x+1	Living above age x	Mean after life time at age x
x	l_x	d_x	q_x	p_x	L_x	T_x	e^0_x
1	2	3	4	5	6	7	8
0	*168,585*	*42,146*	*·25000*	*·75000*	*139,345*	*4,306,793*	*25·55*
1	*126,439*	*12,510*	*·09894*	*·90106*	*119,701*	*4,167,448*	*32·96*
2	*113,929*	*6,723*	*·05901*	*·94099*	*110,468*	*4,047,747*	*35·53*
3	*107,206*	*4,175*	*·03894*	*·96106*	*105,179*	*3,937,279*	*36·73*
4	*103,031*	*3,031*	*·02942*	*·97058*	*101,646*	*3,832,100*	*37·19*
5	100,000	2,488	·02488	·97512	98,756	3,730,454	37·30
6	97,512	2,262	·02320	·97680	96,381	3,631,698	37·24
7	95,250	2,058	·02161	·97839	94,221	3,535,317	37·11
8	93,192	1,879	·02016	·97984	92,253	3,441,096	36·92
9	91,313	1,720	·01884	·98116	90,453	3,348,843	36·67
10	89,593	1,582	·01766	·98234	88,802	3,258,390	36·37
11	88,011	1,463	·01662	·98338	87,280	3,169,588	36·01
12	86,548	1,360	·01571	·98429	85,868	3,082,308	35·61
13	85,188	1,268	·01488	·98512	84,554	2,996,440	35·17
14	83,920	1,194	·01423	·98577	83,323	2,911,886	34·70
15	82,726	1,133	·01370	·98630	82,159	2,828,563	34·19
16	81,593	1,081	·01325	·98675	81,053	2,746,404	33·66
17	80,512	1,037	·01288	·98712	79,993	2,665,351	33·11
18	79,475	1,011	·01272	·98728	78,970	2,585,358	32·53
19	78,464	1,006	·01282	·98718	77,961	2,506,388	31·95
20	77,458	1,001	·01292	·98708	76,957	2,428,427	31·35
21	76,457	999	·01306	·98694	75,958	2,351,470	30·76
22	75,458	997	·01321	·98679	74,959	2,275,512	30·16
23	74,461	995	·01336	·98664	73,964	2,200,553	29·55
24	73,466	995	·01354	·98646	72,968	2,126,589	28·95
25	72,471	995	·01373	·98627	71,974	2,053,621	28·34
26	71,476	998	·01396	·98604	70,977	1,981,647	27·72
27	70,478	1,001	·01421	·98579	69,977	1,910,670	27·11
28	69,477	1,008	·01451	·98549	68,973	1,840,693	26·50
29	68,469	1,017	·01485	·98515	67,961	1,771,720	25·88
30	67,452	1,026	·01521	·98479	66,939	1,703,759	25·26
31	66,426	1,036	·01559	·98441	65,908	1,636,820	24·64
32	65,390	1,046	·01599	·98401	64,867	1,570,912	24·02
33	64,344	1,060	·01648	·98352	63,814	1,506,045	23·41
34	63,284	1,082	·01709	·98291	62,743	1,442,231	22·79
35	62,202	1,106	·01778	·98222	61,649	1,379,488	22·18
36	61,096	1,133	·01855	·98145	60,529	1,317,839	21·57
37	59,963	1,162	·01938	·98062	59,382	1,257,310	20·97
38	58,801	1,190	·02023	·97977	58,206	1,197,928	20·37
39	57,611	1,218	·02114	·97886	57,002	1,139,722	19·78
40	56,393	1,247	·02211	·97789	55,770	1,082,720	19·20
41	55,146	1,282	·02324	·97676	54,505	1,026,950	18·63
42	53,864	1,317	·02445	·97555	53,205	972,445	18·05
43	52,547	1,353	·02574	·97426	51,871	919,240	17·49
44	51,194	1,396	·02726	·97274	50,496	867,369	16·94
45	49,798	1,439	·02889	·97111	49,078	816,873	16·40
46	48,359	1,480	·03060	·96940	47,619	767,795	15·88
47	46,879	1,517	·03237	·96763	46,121	720,176	15·36
48	45,362	1,544	·03403	·96597	44,590	674,055	14·86
49	43,818	1,560	·03560	·96440	43,038	629,465	14·37

CENTRAL INDIA ZONE—MALES

Life Table—(1941-50)—contd.

Age	Living at age x	Dying between ages x and x+1	Mortality rate	Survivance rate	Living between ages x and x+1	Living above age x	Mean after life time at age x
x	l_x	d_x	q_x	p_x	L_x	T_x	e°_x
1	2	3	4	5	6	7	8
50	42,258	1,574	·03724	·96276	41,471	586,427	13·88
51	40,684	1,589	·03905	·96095	39,889	544,956	13·39
52	39,095	1,601	·04096	·95904	38,295	505,067	12·92
53	37,494	1,608	·04289	·95711	36,690	466,772	12·44
54	35,886	1,611	·04489	·95511	35,080	430,082	11·99
55	34,275	1,611	·04700	·95300	33,470	395,002	11·53
56	32,664	1,633	·04999	·95001	31,847	361,532	11·07
57	31,031	1,650	·05316	·94684	30,206	329,685	10·63
58	29,381	1,661	·05653	·94347	28,551	299,479	10·19
59	27,720	1,666	·06009	·93991	26,887	270,928	9·77
60	26,054	1,665	·06388	·93612	25,221	244,041	9·37
61	24,389	1,657	·06790	·93210	23,561	218,820	9·03
62	22,732	1,641	·07216	·92784	21,911	195,259	8·59
63	21,091	1,618	·07668	·92332	20,282	173,348	8·22
64	19,473	1,587	·08147	·91853	18,680	153,066	7·86
65	17,886	1,548	·08654	·91346	17,112	134,386	7·51
66	16,338	1,502	·09191	·90809	15,587	117,274	7·18
67	14,836	1,448	·09760	·90240	14,112	101,687	6·85
68	13,388	1,386	·10350	·89650	12,695	87,575	6·54
69	12,002	1,320	·10998	·89002	11,342	74,880	6·24
70	10,682	1,247	·11672	·88328	10,058	63,538	5·95
71	9,435	1,169	·12383	·87617	8,851	53,480	5·67
72	8,266	1,086	·13134	·86866	7,723	44,629	5·40
73	7,180	1,000	·13926	·86074	6 380	36,906	5·14
74	6,180	913	·14763	·85237	5,723	30,226	4·89
75	5,267	825	·15645	·84355	4,854	24,503	4·65
76	4,442	737	·16574	·83426	4,073	19,649	4·42
77	3,705	651	·17554	·82446	3,380	15,576	4·20
78	3,054	568	·18584	·81416	2,770	12,196	3·99
79	2,486	489	·19668	·80332	2,241	9,426	3·79
80	1,997	416	·20810	·79190	1,789	7,185	3·60
81	1,581	348	·22004	·77996	1,407	5,396	3·41
82	1,233	287	·23257	·76743	1,090	3,989	3·24
83	946	233	·24569	·75431	829	2,899	3·06
84	713	185	·25942	·74058	621	2,070	2·90
85	528	145	·27378	·72622	455	1,449	2·74
86	383	111	·28875	·71125	328	994	2·60
87	272	83	·30437	·69563	230	666	2·45
88	189	61	·32062	·67938	159	436	2·31
89	128	44	·33752	·66248	106	277	2·16
90	84	30	·35510	·64490	69	171	2·04
91	54	21	·37327	·62673	43	102	1·88
92	33	13	·39206	·60794	27	59	1·79
93	20	9	·41145	·58855	15	32	1·60
94	11	5	·43144	·56856	9	17	1·55
95	6	3	·45198	·54802	4	8	1·33
96	3	1	·47304	·52696	3	4	1·33
97	2	1	·49458	·50542	1	1	0·50
98	1	1	·51656	·48344	...	...	...

CENTRAL INDIA ZONE—FEMALES

Life Table—(1941-50)

Age	Living at age x	Dying between ages x and x+1	Mortality rate	Survivance rate	Living between ages x and x+1	Living above age x	Mean after life time at age x
x	l_x	d_x	q_x	p_x	L_x	T_x	e°_x
1	2	3	4	5	6	7	8
0	*173,222*	*38,975*	*·22500*	*·77500*	*149,245*	*4,449,593*	*25·69*
1	*134,247*	*16,108*	*·12222*	*·87778*	*125,245*	*4,300,348*	*32·03*
2	*117,839*	*8,871*	*·07528*	*·92472*	*113,069*	*4,175,103*	*35·43*
3	*108,968*	*5,324*	*·01886*	*·95114*	*106,181*	*4,062,034*	*37·28*
4	*103,644*	*3,644*	*·03516*	*·96484*	*101,799*	*3,955,850*	*38·17*
5	100,000	2,838	·02838	·97162	98,581	3,854,051	38·54
6	97,162	2,463	·02535	·97465	95,931	3,755,470	38·65
7	94,699	2,143	·02263	·97737	93,627	3,659,539	38·61
8	92,556	1,864	·02014	·97986	91,624	3,565,912	38·53
9	90,692	1,622	·01789	·98211	89,881	3,474,288	38·31
10	89,070	1,414	·01587	·98413	88,363	3,384,407	38·00
11	87,656	1,235	·01409	·98591	87,038	3,296,044	37·60
12	86,421	1,085	·01255	·98745	85,879	3,209,005	37·13
13	85,336	958	·01123	·98877	84,857	3,123,127	36·60
14	84,378	856	·01015	·98985	83,950	3,038,270	36·01
15	83,522	776	·00929	·99071	83,134	2,954,320	35·37
16	82,746	715	·00864	·99136	82,389	2,871,186	34·70
17	82,031	673	·00820	·99180	81,694	2,788,797	34·02
18	81,358	659	·00810	·99190	81,029	2,707,103	33·27
19	80,699	667	·00826	·99174	80,366	2,626,074	32·54
20	80,032	691	·00863	·99137	79,687	2,545,708	31·81
21	79,341	726	·00915	·99085	78,978	2,466,021	31·08
22	78,615	772	·00982	·99018	78,229	2,387,043	30·36
23	77,843	827	·01063	·98937	77,429	2,308,814	29·66
24	77,016	893	·01159	·98841	76,570	2,231,385	28·97
25	76,123	963	·01265	·98735	75,642	2,154,815	28·31
26	75,160	1,034	·01376	·98624	74,643	2,079,173	27·66
27	74,126	1,103	·01488	·98512	73,575	2,004,530	27·04
28	73,023	1,168	·01600	·98400	72,439	1,930,955	26·44
29	71,855	1,229	·01710	·98290	71,240	1,858,516	25·86
30	70,626	1,283	·01817	·98183	69,984	1,787,276	25·31
31	69,343	1,335	·01925	·98075	68,676	1,717,292	24·77
32	68,008	1,377	·02025	·97975	67,320	1,648,616	24·24
33	66,631	1,397	·02096	·97904	65,933	1,581,296	23·73
34	65,234	1,396	·02140	·97860	64,536	1,515,363	23·23
35	63,838	1,389	·02176	·97824	63,144	1,450,827	22·73
36	62,449	1,381	·02211	·97789	61,759	1,387,683	22·22
37	61,068	1,371	·02245	·97755	60,382	1,325,924	21·71
38	59,697	1,367	·02290	·97710	59,013	1,265,542	21·20
39	58,330	1,369	·02347	·97653	57,645	1,205,529	20·68
40	56,961	1,372	·02409	·97591	56,275	1,148,884	20·17
41	55,589	1,374	·02471	·97529	54,902	1,092,609	19·66
42	54,215	1,375	·02537	·97463	53,528	1,037,707	19·14
43	52,840	1,381	·02613	·97387	52,150	984,179	18·63
44	51,459	1,383	·02688	·97312	50,767	932,029	18·11
45	50,076	1,385	·02766	·97234	49,384	881,262	17·60
46	48,691	1,387	·02849	·97151	47,997	831,878	17·08
47	47,304	1,389	·02936	·97064	46,609	783,881	16·57
48	45,915	1,391	·03030	·96970	45,220	737,272	16·06
49	44,524	1,393	·03129	·96871	43,827	692,052	15·54

CENTRAL INDIA ZONE—FEMALES

Life Table (1941-50)—contd.

Age	Living at age x	Dying between age x and x+1	Mortality rate	Survivance rate	Living between ages x and x+1	Living above age x	Mean after life time at age x
x	l_x	d_x	q_x	p_x	L_x	T_x	$e°_x$
1	2	3	4	5	6	7	8
50	43,131	1,395	·03234	·96766	42,434	648,225	15·03
51	41,736	1,397	·03347	·96653	41,038	605,791	14·51
52	40,339	1,399	·03468	·96532	39,639	564,753	14·00
53	38,940	1,401	·03598	·96402	38,239	525,114	13·49
54	37,539	1,405	·03743	·96257	36,837	486,875	12·97
55	36,134	1,409	·03899	·96101	35,429	450,038	12·45
56	34,725	1,432	·04125	·95875	34,009	414,609	11·94
57	33,293	1,457	·04376	·95624	32,565	380,600	11·43
58	31,836	1,493	·04690	·95310	31,089	348,035	10·93
59	30,343	1,544	·05087	·94913	29,571	316,946	10·45
60	28,799	1,588	·05513	·94487	28,005	287,375	9·98
61	27,211	1,608	·05906	·94094	26,407	259,370	9·53
62	25,603	1,620	·06326	·93674	24,793	232,963	9·10
63	23,983	1,626	·06776	·93224	23,170	208,170	8·68
64	22,357	1,623	·07256	·92744	21,545	185,000	8·27
65	20,734	1,611	·07766	·92234	19,929	163,455	7·88
66	19,123	1,590	·08314	·91686	18,328	143,526	7·51
67	17,533	1,560	·08896	·91104	16,753	125,198	7 14
68	15,973	1,520	·09516	·90484	15,213	108,445	6·79
69	14,453	1,472	·10180	·89820	13,717	93,232	6·45
70	12,981	1,413	·10883	·89117	12,275	79,515	6·13
71	11,568	1,347	·11636	·88364	10,895	67,240	5·81
72	10,221	1,272	·12436	·87564	9,585	56,345	5 51
73	8,949	1,189	·13286	·86714	8,354	46,760	5·23
74	7,760	1,101	·14188	·85812	7,210	38,406	4·95
75	6,659	1,009	·15150	·84850	6,155	31,196	4·68
76	5,650	914	·16166	·83834	5,193	25,041	4·43
77	4,736	817	·17248	·82752	4,328	19,848	4·19
78	3,919	721	·18388	·81612	3,559	15,520	3·96
79	3,198	627	·19600	·80400	2,885	11,961	3·74
80	2,571	537	·20870	·79130	2,302	9,076	3·53
81	2,034	452	·22220	·77780	1,808	6,774	3·33
82	1,582	375	·23643	·76357	1,394	4,966	3·14
83	1,207	304	·25142	·74858	1,055	3,572	2·96
84	903	242	·26717	·73283	782	2,517	2·79
85	661	188	·28372	·71628	567	1,735	2·63
86	473	143	·30108	·69892	401	1,168	2·47
87	330	106	·31922	·68078	277	767	2·33
88	224	76	·33819	·66181	186	490	2·19
89	148	53	·35797	·64203	122	304	2·05
90	95	36	·37846	·62154	77	182	1·92
91	59	24	·39980	·60020	47	105	1·78
92	35	15	·42190	·57810	27	58	1·66
93	20	9	·44473	·55527	16	31	1·55
94	11	5	·46822	·53178	9	15	1·36
95	6	3	·49235	·50765	4	6	1·00
96	3	2	·52801	·47199	2	2	0·67
97	1	1	·54218	·45782	...	...	...

Table B—Expectation of Life and Mortality Rates for Maximum and Minimum Infant Mortality Rates

	All-India Males				All-India Females			
Age	$q_0 = \cdot 16$		$q_0 = \cdot 25$		$q_0 = \cdot 145$		$q_0 = \cdot 225$	
x	q_x	e_x°	q_x	e_x°	q_x	e_x°	q_x	e_x°
0	·16000	33·67	·25000	29·87	·14500	32·85	·22500	29·62
1	·06009	39·02	·06319	38·75	·07950	37·35	·08198	37·13
2	·03613	40·49	·03728	40·34	·04871	39·54	·04966	39·47
3	·02476	40·99	·02537	40·88	·03252	40·54	·03303	40·45
4	·01955	41·02	·01993	40·93	·02467	40·89	·02577	40·81
	North India Zone Males				North India Zone Females			
Age	$q_0 = \cdot 125$		$q_0 = \cdot 225$		$q_0 = \cdot 115$		$q_0 = \cdot 2$	
x	q_x	e_x°	q_x	e_x°	q_x	e_x°	q_x	e_x°
0	·12500	35·46	·22500	31·20	·11500	35·81	·20000	32·20
1	·06054	39·47	·06371	39·19	·06708	39·41	·06962	39·18
2	·03613	40·98	·03731	40·82	·04113	41·21	·04209	41·08
3	·02434	41·50	·02497	41·39	·02769	41·96	·02820	41·86
4	·01890	41·52	·01930	41·44	·02107	42·14	·02140	42·06
	East India Zone Males				East India Zone Females			
Age	$q_0 = \cdot 16$		$q_0 = \cdot 25$		$q_0 = \cdot 145$		$q_0 = \cdot 225$	
x	q_x	e_x°	q_x	e_x°	q_x	e_x°	q_x	e_x°
0	·16000	30·58	·25000	27·14	·14500	29·36	·22500	26·47
1	·07405	35·34	·07704	35·10	·08195	33·27	·08441	33·07
2	·04605	37·13	·04718	37·00	·05268	35·20	·05363	35·08
3	·03244	37·90	·03303	37·80	·03738	36·13	·03788	36·04
4	·02616	38·16	·02656	38·08	·02986	36·51	·03019	36·44
	South India Zone Males				South India Zone Females			
Age	$q_0 = \cdot 16$		$q_0 = \cdot 25$		$q_0 = \cdot 145$		$q_0 = \cdot 225$	
x	q_x	e_x°	q_x	e_x°	q_x	e_x°	q_x	e_x°
0	·16000	36·64	·25000	32·50	·14500	37·67	·22500	33·96
1	·05515	42·56	·05827	42·27	·06149	43·00	·06408	42·75
2	·03242	44·02	·03358	43·86	·03683	44·79	·03780	44·65
3	·02172	44·48	·02235	44·36	·02432	45·49	·02484	45·38
4	·01681	44·46	·01718	44·37	·01820	45·61	·01851	45·53

Table B—Expectation of Life and Mortality Rates for Maximum and Minimum Infant Mortality Rates—contd.

	West India Zone Males				West India Zone Females			
Age	q_0 = ·16		q_0 = ·25		q_0 = ·145		q_0 = ·225	
x	q_x	$\mathring{e}_x$	q_x	$\mathring{e}_x$	q_x	$\mathring{e}_x$	q_x	$\mathring{e}_x$
0	·16000	32·48	·25000	28·93	·14500	32·30	·22500	29·12
1	·07321	37·58	·07620	37·39	·07837	36·71	·08086	36·49
2	·04291	39·50	·04405	39·38	·04737	38·79	·04833	38·66
3	·02803	40·24	·02865	40·14	·03108	39·69	·03159	39·60
4	·02106	40·39	·02146	40·30	·02295	39·95	·02323	39·88
	Central India Zone Males				Central India Zone Females			
Age	q_0 = ·230		q_0 = ·3		q_0 = ·205		q_0 = ·275	
x	q_x	$\mathring{e}_x$	q_x	$\mathring{e}_x$	q_x	$\mathring{e}_x$	q_x	$\mathring{e}_x$
0	·23000	26·22	·30000	23·70	·20500	26·37	·27500	23·92
1	·09825	32·95	·10082	32·75	·12161	32·06	·12386	31·87
2	·05875	35·50	·05976	35·37	·07503	35·44	·07595	35·32
3	·03879	36·68	·03934	36·59	·04872	37·27	·04924	37·18
4	·02932	37·14	·02969	37·07	·03508	38·16	·03542	38·08

GIPD S1 - 152CC India - 6-1-54—3,000—

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PRINTED BY THE MANAGER, GOVERNMENT OF INDIA PRESS, NEW DELHI
AND PUBLISHED BY THE MANAGER OF PUBLICATIONS, DELHI, 1954